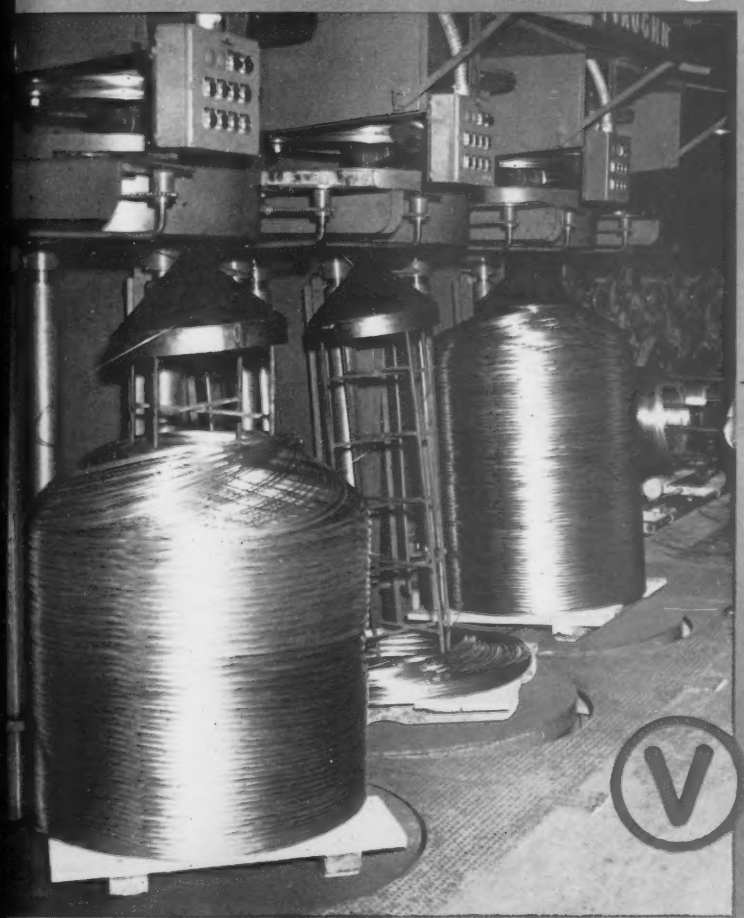
JULY 1961

WIRE AND WIRE PRODUCTS

New Vaughn®

INVERTED STATIONARY BLOCK

with rotating turntable



for Controlled Coiling

(and beautiful bundles!)

You've got everything under control with our new Inverted Stationary Block. It produces uniform, heavy, precisely-sized bundles exactly as you want them, strictly in accord with efficient handling and shipping requirements. Let us relate these latest special advantages to your own operations. Write!

THE VAUGHN MACHINERY COMPANY

CUYAHOGA FALLS, OHIO, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

COULTER & McKENZIE

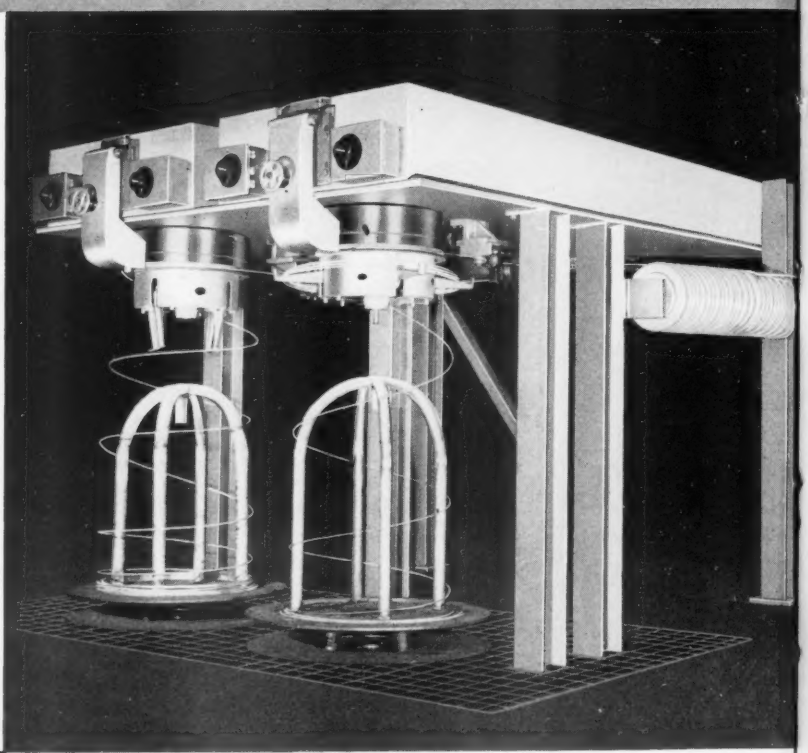
ANNOUNCES THE WIRE INDUSTRY'S MOST VERSATILE TAKE-UP & WIRE PACKAGING MACHINE!

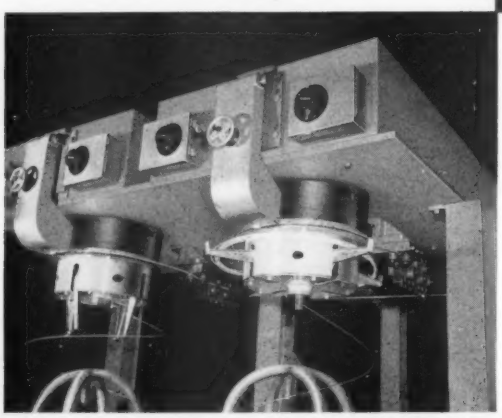
Vari-Coil

For PATENTING
ANNEALING
GALVANIZING
ENAMELING
TINNING
FINAL DRAW

- √ Non-Stop Package Changing
- √ Package Sizes to 4,000 lbs.
- √ Coil Diameters to 36″
- √ Speeds Infinitely Variable
- √ Wire Size to ⅜″ (.375″)
- √ Ferrous and Non-Ferrous Materials Including High Carbon Steel

THERE IS A SIZE FOR ALL APPLICATIONS. SINGLE OR MULTIPLE UNITS FOR YOUR INDIVIDUAL JOB.





For information concerning your application, please write or telephone.

1 INFINITELY VARIABLE RANGE OF COIL SIZES
a. All sizes wire from same capstan.
b. Current models with coil ranges 16″ to 26″ and 24″ to 36″ without changing blocks.
c. Coil sizes may be altered without stopping.

2 GREATER COIL WEIGHTS
a. Turn tables accommodate coils, drum paks and stems (200 to 1200 lbs.)
b. Oversize loads on handling pallets (1000 to 4000 lbs.)

3 INCREASED RANGE OF WIRE AND ROD SIZES
a. Precise cast control of fine wire to coarse rod.
b. No axial twist.

4 ACCUMULATOR HEAD PROVIDES INTERVAL FOR STRIPPING AT OPERATOR'S CONVENIENCE
a. Accumulator operating in conjunction with main take-up block is key to uninterrupted constant speed take-up.
b. Operator has 5 to 10 minutes accumulation time for stripping finished package from turn table.

This equipment manufactured under one of the following U. S. Patents 2,732,060; 2,868,474; 2,844,416; 2,868,268; 2,981,494 or others pending.

Barron & Crowther Ltd., Eastleigh, Hants, England, European Draw-Pak Licensee
Idos Industries Ltd., Royston, Herts, England, Sales Agents.

35 UNION AVENUE

TELEPHONE EDISON 5-1101
LIEBER'S CODE "MACKENZIE"

THE COULTER & McKENZIE MACHINE CO., INC.

SINCE 1942 BRIDGEPORT 7 CONNECTICUT U. S. A. INCORPORATED 1951

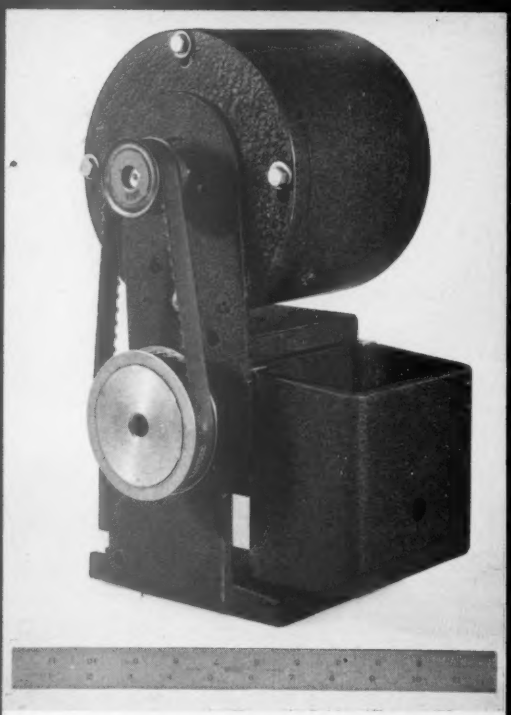
ROTATING DIE HOLDER

model R. O. no. 1

designed and engineered by

STANDARD INDUSTRIAL

FRANKFORT, ILLINOIS



COMPLETE UNIT WITH LUBE BOX
BELT GUARD REMOVED

PRICE PER UNIT 450^{00}

F.O.B. POINT OF SHIPMENT

STANDARD SPECIFICATIONS

POWER —½ h.p. motor 110 single-phase or 220 3-phase

WEIGHT — 110 lbs. complete with 1.7 qt.-capacity lubricant box.

SPEED — 43 or 86 R.P.M.

DRIVE — Notch belt quiet drive. May be driven forward or reverse.

OLITE BEARINGS — Permanent lubrication.

Timken Roller Bearings used throughout.

Tool Steel Gear and Worm.

All moving parts machine ground.

Standard Die Cavity, 2" diam., 1⅜" depth.

Thrust Load 11000 lbs. at 43 R.P.M.

Cooling — Teflon Sealed Water-Cooled Die Chamber.

Threaded Die Retainer Cap with Spanner Wrench.

SERVICE · INTEGRITY · DEPENDABILITY

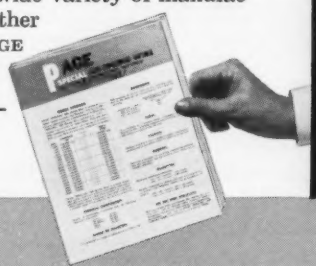
DRIVE GUARD REMOVED SHOWING
BELT DRIVE AND DIE ADAPTERS

CUT WIRE COSTS UP TO 60%!
...with Page Special HB

If you are now using music wire, or if you have been prevented from using it because of its high cost, it makes good sense to investigate PAGE *Special* HB. In every case, the tensile strengths of *Special* HB approach those of music wire—and in sizes .090″ and coarser equals them! Moreover, *Special* HB costs as much as 60% less than music wire.

A hard-drawn, high-carbon steel wire, *Special* HB is available in galvanized or bright finishes and in diameters from .020″ to .162″. We'll be glad to send you the full story, including a detailed comparison of tensile strengths.

As America's leading special-purpose wire mill, PAGE can supply a wide variety of manufacturers wire items with just the tensile strength, ductility, finish and other properties you need. Tell us your requirements—we'll recommend a PAGE wire to help you reduce costs and improve your product.



Write us at Monessen, Pa. for Booklet **DH-107** on *Special* HB—or for information on what PAGE has to offer to meet your other wire requirements.

PAGE

the source for answers to wire problems

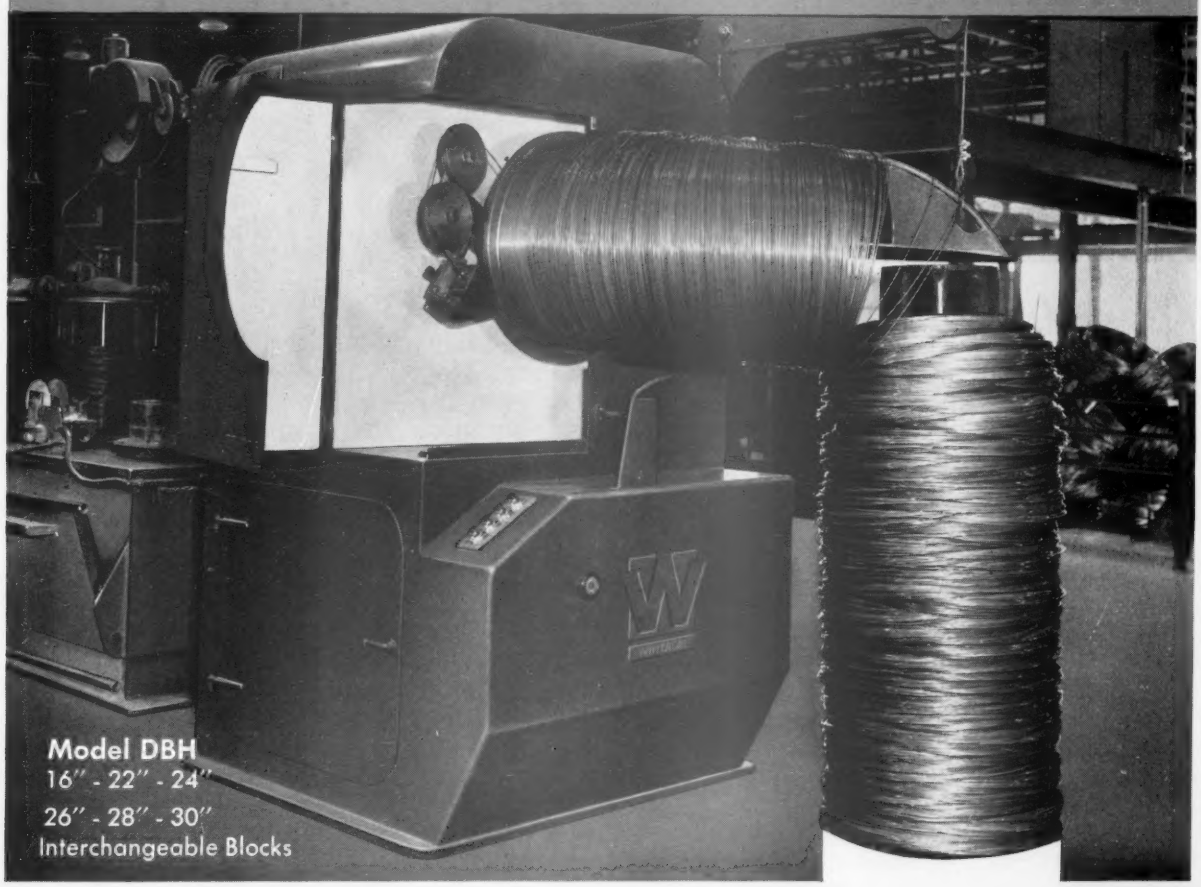
ACCO

PAGE STEEL AND WIRE DIVISION • AMERICAN CHAIN & CABLE COMPANY, INC.

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

WHITACRE WIRE DRAWING DEAD BLOCK

Water Cooled Die and Block Available



Save with these advantages:
You get continuous increased production because no down time is necessary for stripping...changing dies in a supplying drawing machine..."run down" of accumulation type machines... packaging into stationery container or uninterrupted palletizing on stems... inspection or sampling. There is no tangling nor snarling from handling • Breaks welded in production • No back gearing nor similar mechanism • You save by greatly reduced floor space requirements • Dead block can be located anywhere with wire literally piped from wire drawing machine • Low scrap loss • Increased production through lessened operator fatigue • Design simplicity • Maintenance eliminated except for occasional lubrication of main bearings and motor bearings • Extra large packages for in-process wire • Greatly reduced handling and in-plant transportation costs • Low capital investment.

MODELS AVAILABLE

16" Wire Drawing Dead Block, Model DBM • Model DBH 16" to 30". Model DBXH 30" Wire Drawing Dead Block for heavy gauges and rods including ⅜" • Combination Galvanizing or Tinning Dead Block Take-ups, 16" to 30", Model GF • 26" Heavy Wire Galvanizing or Tinning Dead Block Take-up, Model GFH. Write today for specifications.

APPROACHES
100%
CONTINUOUS
PRODUCTION
EFFICIENCY

WHITACRE CORPORATION
5649 Alhambra Ave. • Los Angeles 32, California • CApitol 5-2476

Why more and more wire producers are increasing profits by switching to Molysulfide® Lubricants

The ever increasing profit squeeze on wire producers during the past five years, has spotlighted the value of Molysulfide for more efficient and higher speed wire drawing. Ferrous and non-ferrous producers have reduced wire breakage, increased die life, run more wire and, at the same time, increased the quality of their products.

The reason: Molysulfide has an extremely low coefficient of friction, the lowest of any known solid lubricant. Molysulfide forms a protective film around the wire — a film stronger than the yield point of most metals. As a result, you prevent scratching and seizing, get fewer rejects, less breakage and longer runs with less downtime. At the same time, die life is increased because minute portions of Molysulfide stay on the dies.

- **High carbon wire** — By using Molysulfide lubricants, a large steel company has increased wire-drawing speeds several hundred feet per minute. In some cases they doubled the previous drawing speeds.
- **Aluminum core wire** — Tests conducted on a 0.70 carbon steel for aluminum core wire, through a five-hole Vaughn running lime-coated rod, increased drawing speeds from 800 fpm to 1500 fpm. During the trial run, 20 bundles of wire were drawn with only 0.0002 wear on the finishing die.
- **Nuclear type wire** — Drawing results "improved immeasurably" on tough nuclear, reactive and refractory type metals.
- **Wire rope** — A molybdenum disulfide-bearing metallic soap, used in drawing wire for wire rope, increased wire-rope wear, life and toughness. Fatigue tests and field tests showed superiority ranging from 23 to 40% over other wire ropes.
- **Copper wire** — Before Molysulfide wire drawing lubricants were used, dies began failing after an average of three spools. Now an average of 60 spools (approximately 15,000 lbs.) can be drawn without die damage. Drawing speed has increased from 1,200 fpm to 2,000 fpm.

Can you break through your profit squeeze solely by using a wire-drawing lubricant containing Molysulfide? It's more than likely. And it's certainly an inexpensive possible means of increasing your wire-drawing efficiency — and your profit too.

For information about wire-drawing lubricants containing Molysulfide write to us; the Climax Molybdenum Company Division of American Metal Climax, Inc., 1270 Avenue of the Americas, New York 20, N.Y.

CLIMAX MOLYBDENUM

CLIMAX MOLYBDENUM COMPANY

a division of AMERICAN METAL CLIMAX, INC.

1270 Avenue of the Americas, New York 20, N.Y.

WIRE AND WIRE PRODUCTS*

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 36 July, 1961 No. 7

Designated as Official Publication By The Wire Association

Contents

Annual Convention of The Wire Association 848
The Wire Association—Electric Wire & Cable Section 850
The Wire Association—Technical Papers for the Annual Convention 852
The Wire Outlook 859
Extruded Cellular Vinyl by Andrew D. Varenelli 861
Evolution of Stranding Equipment for Exchange Area Cable at Western Electric Company by Lester O. Reichelt 866
Application of Paper Fillers in Electrical Cables by R. L. D. Aigler 871
Silicone Rubber Insulated Wire by Joseph D. Harrington 877
Bead Wire 881
A Unique System of Gauge and Tension Control in a Steel Mill by Leo Walter 884
Observations Upon Production Planning and Control in a Steel Wire Mill by D. W. Bedford 886
Sylvania Dedicates and Opens New Weld Plant 891
Wire Kinks ..... 893 and 895
Waterbury-Farrel Dedicates New Plant 897
Outstanding Personalities of the Wire Industry 906
Steel Statistics 912
A Review of Recent Wire Patents 915
Aluminum Statistics 922
Copper Statistics 924
The Wire Association Future Conventions 929
Index to Advertisers 943
Where-to-Buy 944-948

WIRE and WIRE PRODUCTS is indexed regularly by Engineering Index, Inc., New York, N. Y. The H. W. Wilson Co., New York, N. Y.

RICHARD E. BROWN, President and Publisher
R. S. Spengel, Secy.-Treas. & Gen'l. Manager
J. Edward Donnellan, Vice-President
Edmund D. Sickels, Editor
Publication Office: Guilford, Conn.
Executive Office: 453 Main St., Stamford, Conn.
*** Reg. U. S. Pat. Off.**

WIRE AND WIRE PRODUCTS, Vol. 36, No. 7, July, 1961. Publication Office at Guilford, Conn. Executive Office 453 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Sec'y and Treas. Subscription Price: U. S. and Canada, $8.00 per year; Domestic 75 cents per copy; Foreign 90 cents per copy except October Convention Issue and January Proceedings Issue, $1.25 per copy; Foreign $10.50 per year. Second class postage paid at Guilford, Conn. under the act of March 3, 1879, Copyright, 1961, Quinn-Brown Publishing Corp.

Shore Line Times Publishing Company, Guilford, Connecticut

ACHIEVE ALACRITY

For those small spring wires too tough for pliers, try our #4 TODD cutter.

A really "quality" tool at pliers price!

Replaceable jaws? Naturally!

STOCKED BY MOST MILL SUPPLY DEALERS

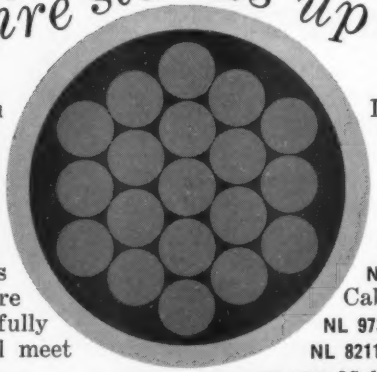
made by

M. W. ROBINSON CO., INC.

ROCKFALL, CONN., U.S.A.

Please feel free to consult us with your wire cutting problems.

Nelco coated wire stands up to the elements



What's the "hidden ingredient" you look for in a lacquer? It's the organization behind it. Research. Testing facilities. Pilot plant runs. Production capacity. And of course experience.

That's what makes Nelco lacquers the *lacquers with a difference.* They're not just "mixed" — they're carefully *formulated* to make certain they'll meet your strictest specifications.

Of our hundreds of stock formulations for wire and cable coating, we've listed a few here. With our unique facilities we can *custom* formulate still others to meet special requirements.

Send for the Nelco Data Book. You'll have facts — at your fingertips — for every construction. Or send us information on your coating problems.

Look at this array of lacquers. High temperature resistant. Clear, glossy film. Flame retardant. Fray prevention. MIL spec. finishes. Fungus resistant.

NL 7147 Nelco Clear Cable Coating
NL 8223 Nelco Clear Heat Resistant Cable Coating
NL 9731 Nelco Flame Retardant Saturant
NL 8211 Nelco Moisture Resistant Saturant
NL 9776 Nelco Clear Cellulose Acetate Cable Coating
R 4026 Nelco High Temperature Resistant Cable Coating
R 5979 Nelco Clear Nylon Cable Coating
R 6625 Nelco Ribbon Cable Adhesive

Back of Nelco lacquers are 40 years experience serving the wire and cable industry.

Nelco LACQUERS

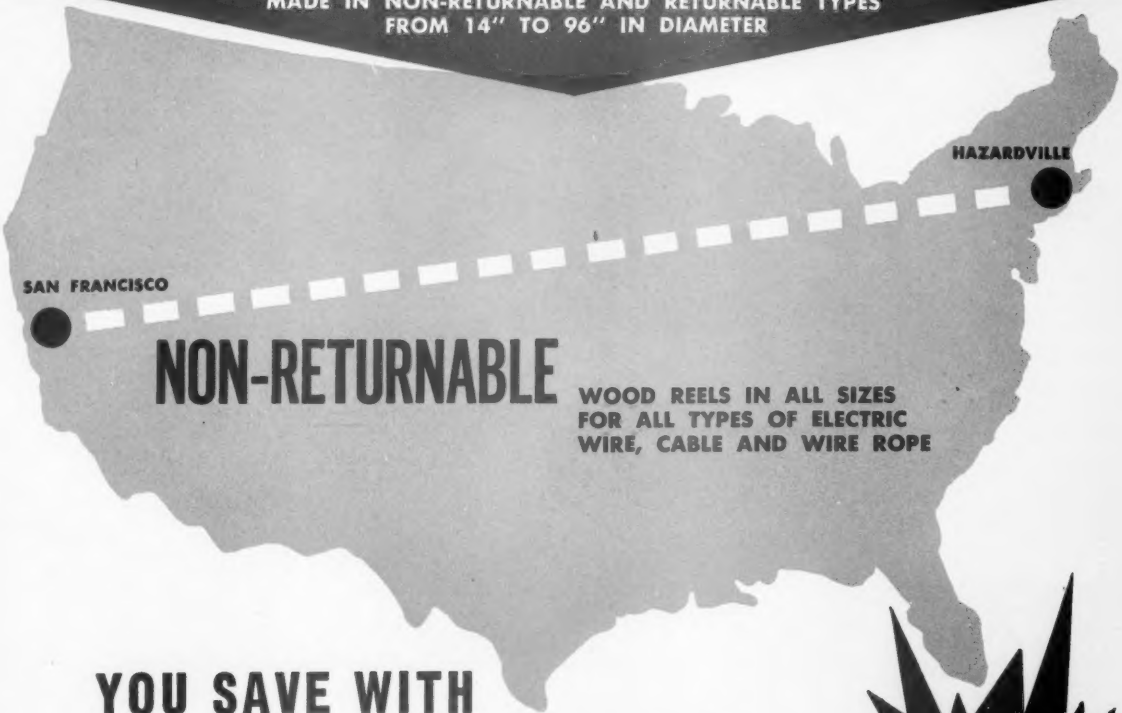
Not just mixed ... they're formulated

NELCO LACQUER DIVISION, **CHEMICAL PRODUCTS CORPORATION**, EAST PROVIDENCE, RHODE ISLAND

A BOARDWALK FROM HAZARDVILLE TO SAN FRANCISCO

The wood used in the manufacture of BRIDGE REELS, in one average year's production, would make a boardwalk one-inch thick and twelve inches wide stretching over 3,000 miles across the country — OR — it would provide enough lumber to build 3,000 six-room houses — THAT'S QUITE AN OPERATION! The important deduction, however, is that BRIDGE REELS for WIRE, WIRE ROPE and CABLE are good enough to meet the exacting demands of most of the big wire plants of the country.

MADE IN NON-RETURNABLE AND RETURNABLE TYPES FROM 14" TO 96" IN DIAMETER

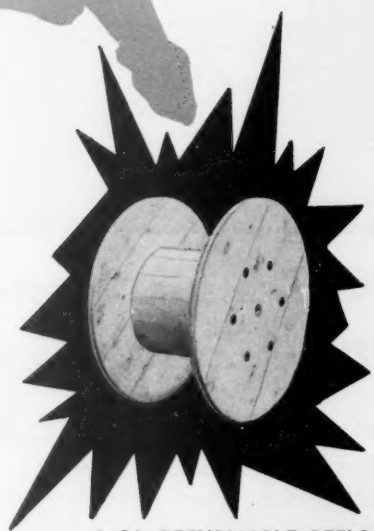


NON-RETURNABLE

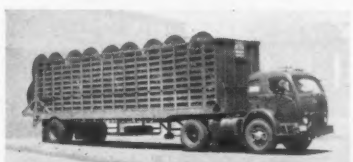
WOOD REELS IN ALL SIZES FOR ALL TYPES OF ELECTRIC WIRE, CABLE AND WIRE ROPE

YOU SAVE WITH NON-RETURNABLES

- **Reduced Reel Investment**
- **Less Storage Space**
- **Lower Freight Costs**
- **No Repair Costs**
- **No Return Freight Charges**
- **No Bookkeeping**
- **No Deposits Needed**
- **No More Headaches!!**



NON-RETURNABLE REELS GIVE YOU A DEFINITE PACKAGING COST.



HIGH SPEED

SHIPPING SERVICE IN OUR OWN TRUCKS

within a radius of 250 miles from the plant. Fast freight will bring you Bridge reels within a few days east of the Mississippi.

BRIDGE

MANUFACTURING COMPANY
HAZARDVILLE, CONNECTICUT
Telephone . . .
Thompsonville, Connecticut
Riverview 9-8308

"REEL GOOD . . .

Let us quote on your reel needs. Send us your specifications. Better yet, visit our plant and see how and why Bridge reels are made so well at so low a cost.

WOOD REELS"

CF&I Shaped Coils and Stem-Paks® are Packaged for Your Production

SHAPED COILS

Here's a quote from one satisfied user, the president of a wire fabricating plant:

> "A CF&I salesman examined our operation and suggested that we use CF&I Shaped Coils as opposed to the small coils we had previously used. We now stop our machine only once to start a new coil, instead of 10 times a day. We save nearly 2 hours, and have increased our production by about 20%."

CF&I-Wickwire Shaped Coils contain between 1500 and 2500 lbs. of top quality wire in one continuous length . . . are bundled with four steel straps and, when necessary, wooden supports to insure that the coil is not distorted.

OPERATING ADVANTAGES: Increased production, reduced material-handling costs, less wire scrap and less storage space needed.

DISPOSABLE STEM-PAKS

The experience of a typical user:

> "Up to 75% of our production downtime was caused by using too many small coils. Stem-Paks hold 500 to 1000 pounds of continuous wire. These larger packages keep each machine running as much as 1½ hours longer per day. Stem-Paks allow for free unwinding, without snarling. CF&I Stem-Paks have increased our production 50%."

Stem-Paks hold 500-1000 lbs. of wire in one continuous

length . . . consist of a center core attached to a wooden base mounted on 4″ runners.

AVAILABLE IN: Sizes for 14″, 17″ and 21″ center core (inside diameter).

OPERATING ADVANTAGES: Ease of handling, reduced scrap losses, increased production and less storage space.

Only CF&I offers a total of ten different wire packages. You've just read how two of these packages have increased the production efficiency of leading manufacturers. One or more CF&I-Wickwire Wire packages can do the same for you. Our engineering staff will be happy to study your operation and recommend the type that best meets your requirements. For complete details, write your local CF&I sales office.

THE COLORADO FUEL AND IRON CORPORATION
Denver • Oakland • New York
Sales Offices in Key Cities K114

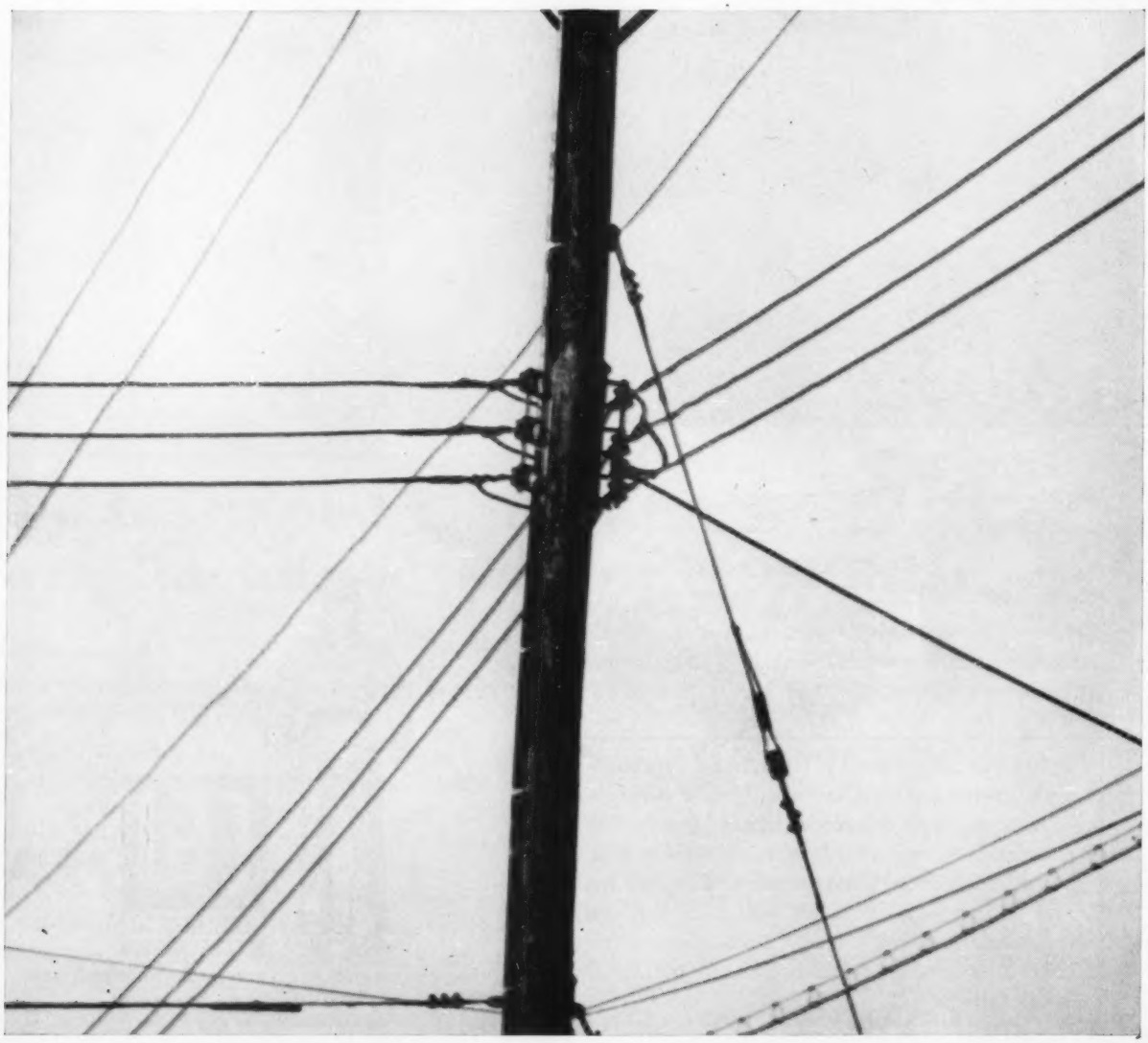
for the right number in line and drop wire insulation ...

Monsanto Polyethylene compounds MPE 12 and MPE 11302 help make line and drop wire insulation economical to use and maintain because they impart superior weather-aging characteristics, good abrasion resistance, and resistance to fatigue, insuring long service life. MPE 12 and MPE 11302 contribute to excellent appearance—smooth surface, good gloss, and excellent carbon black dispersion.

Both offer fast extrusion rates. You can be sure of product uniformity because of Monsanto blend to blend uniformity. These resins impart good physical and electrical properties, meeting all applicable A.S.A. and IPCEA specifications.

Monsanto Polyethylene formulations are based on long experience in supplying the specialized needs of the Wire and Cable Industry. MPE 12 and MPE 11302 are but two in Monsanto's range of polyethylene resins developed for wire insulation. For more information, write to Monsanto Chemical Company, Plastics Division, Room 827, Springfield 2, Mass.

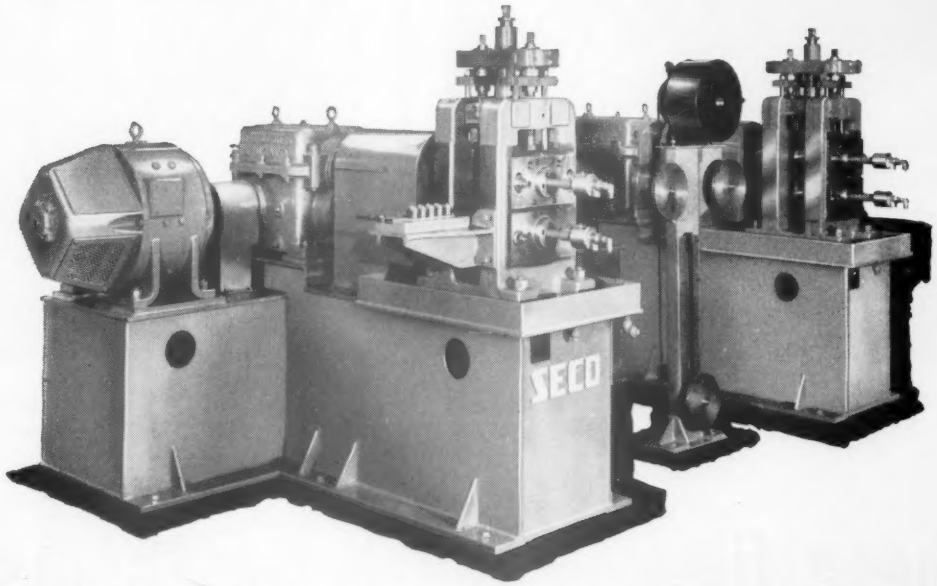
Monsanto®



Predictable Performance

is yours when you change to

SECO WIRE FLATTENING MILLS



Acceptable and predictable performance "on both sides of the fence" when Seco Wire Flattening Mills are used in your operation.

Seco's staff of trained engineers . . . specialists in solving production problems . . . are available for personal assistance to you. Call us today.

SECO

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

STEEL EQUIPMENT COMPANY

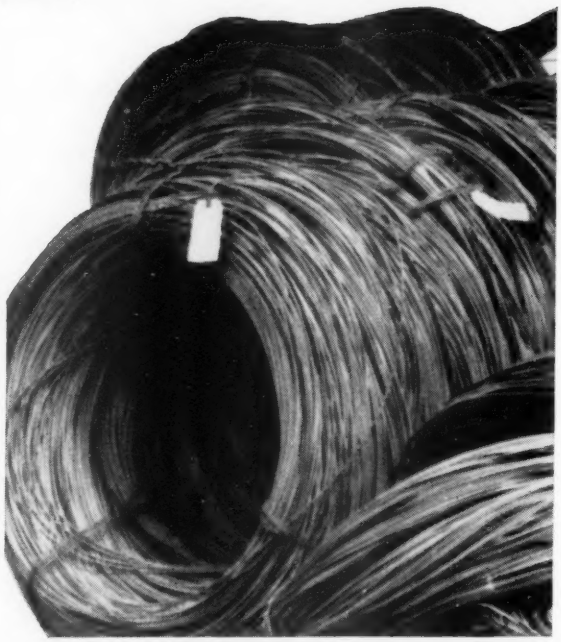
P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

AFFILIATED WITH *Lee Wilson* ENGINEERING CO., INC.

Operation: Descaling

(One of a series)

Drawn and annealed wire descaled up to 800 feet per minute



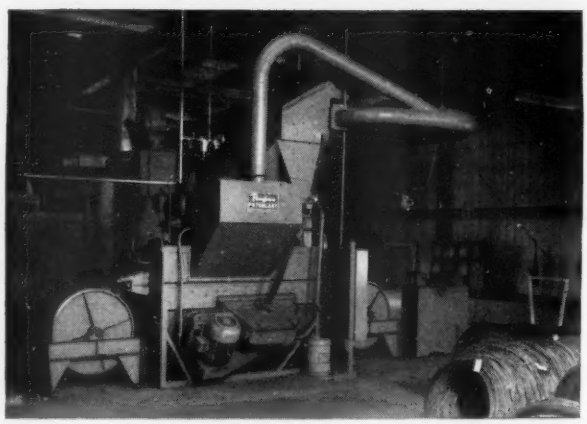
Hot rolled rod descaled at 200-600 feet per minute

These figures speak for themselves!

Compare these speeds with your own descaling performance. Then consider this: fast descaling time is only one of many reasons why Pangborn Rotoblast cuts your costs.

Here are some other specifics: Rotoblast eliminates loss of virgin metal . . . ends acid disposal problems . . . requires less space . . . reduces original investment by as much as 70% over pickling equipment. Rotoblast descaling equipment goes to work at the touch of a button. Because it is a dry process, it is absolutely non-toxic, an important aid to employee morale. Rotoblasting gives an improved surface for application of lubricant.

You save money other ways, too. You can maintain Rotoblast more easily. Because Rotoblast Cabinets are fully lined with wear plates, you never have to replace the cabinets themselves. All three wheels of the Rotoblast units assembly are fully exposed and easily accessible—not locked up inside the equipment. Overall result: lower operating costs, lower maintenance costs.



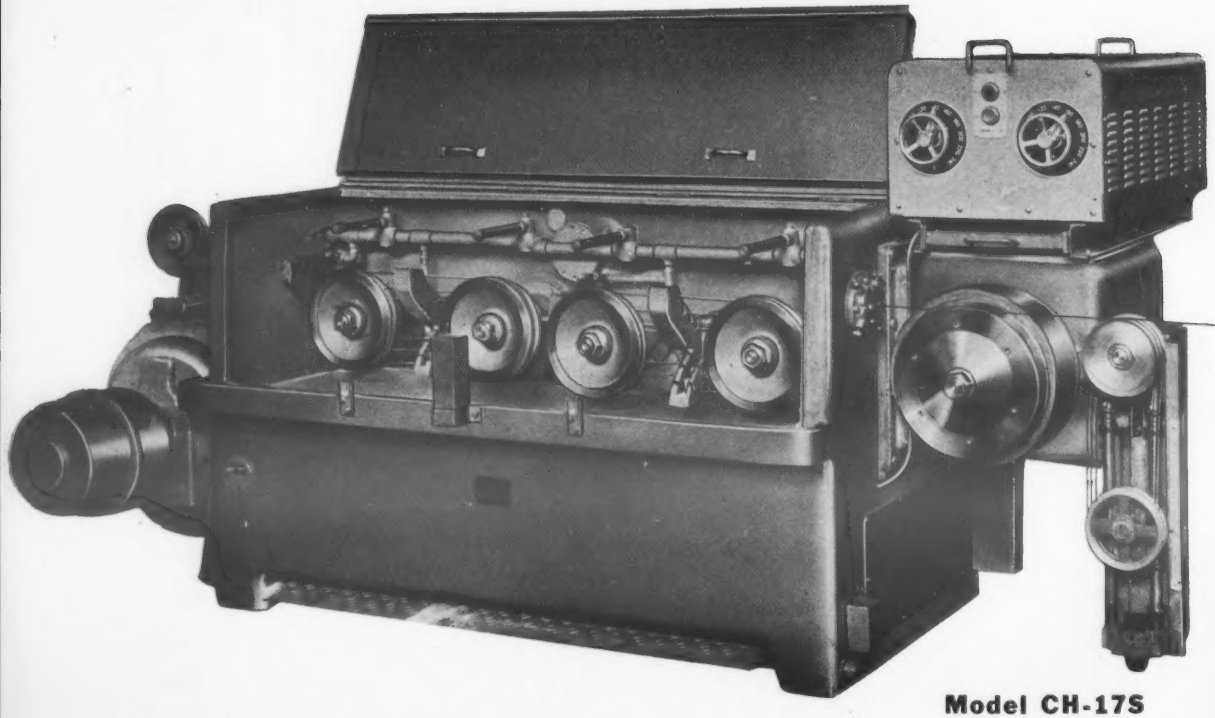
Pangborn

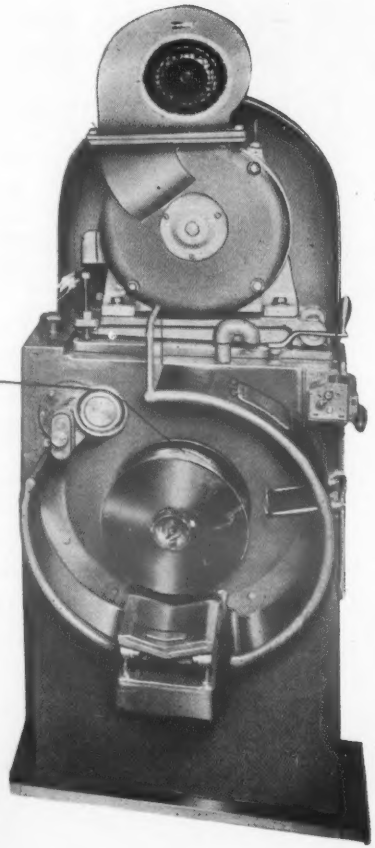
OF HAGERSTOWN

For more detailed information, write: PANGBORN CORPORATION, 5400 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada, Ltd., 47 Shaft Rd., Toronto (Rexdale), Canada—*Manufacturers of Blast Cleaning, Vibratory Finishing, Dust Control Equipment; Rotoblast® Steel Shot and Grit®.*

WIRE DRAWING MACHINE
for coarse fine wire

SHOWA MACHINE WORKS LTD.





Model CH-17S

Entry diam.	2.3 m/m
Finished diam.	0.65 m/m to 0.32 m/m
Number of dies	17
Finishing speed	1300 m/min.
Power required	50 HP

SHOWA MACHINE WORKS LTD.
NO. 16, NAKA 3-CHOME, MITEZIMA, NISHI-YODOGAWA-KU, OSAKA, JAPAN

ALL ELECTRIC

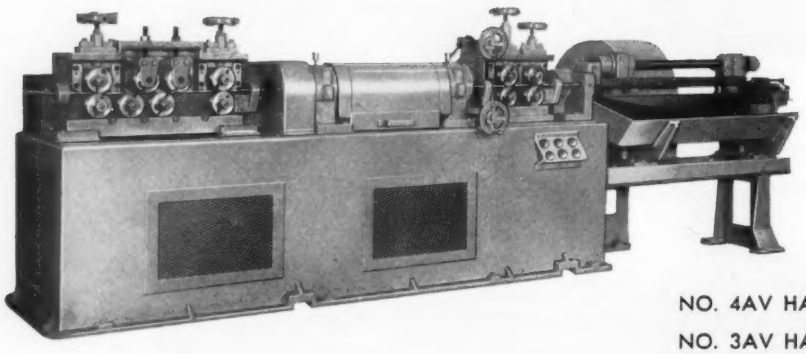
SHUSTER

Wire Straightening and Cutting Machines your BEST BUY!

Dual Control

3AV & 4AV

***with* INFINITE SPEEDS**



NO. 4AV HANDLES 11/16" MAX.
NO. 3AV HANDLES 9/16" MAX.

Two famous SHUSTERS, the Variable Speed 4AV and 3AV, now come equipped with all-electric controls. Each has two Infinite Variable Speed Transmissions which allow optimum production on any length, diameter or type of wire. Both the speed of feed, and the speed of cut-off are individually controlled. Other features include positive release electric target, roll type clutch with solenoid control and electro-magnetic brake on clutch shaft.

The 4AV handles basic wire 3/8" to 11/16" at 90 to 180 feet per minute or with constant cutting action at 3" to 26" from 85 to 101 cuts per minute.

The 3AV handles basic wire 1/4" to 9/16" at 76 to 228 feet per minute or with constant cutting action at 3" to 30" from 85 to 156 cuts per minute.

Our new line of SHUSTER Wire Straightening and Cutting Machines and Components with capacities from .020" to 11/16" are considered the finest made. Write for Bulletin 37VR.

METTLER MACHINE TOOL, INC.

155 W. Adeline, New Haven, Connecticut

THINKING OF PURCHASING A WIRE MESH MACHINE?

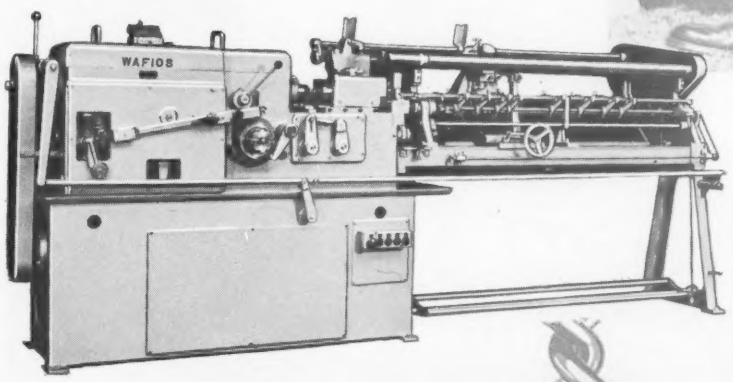
BUILD A BETTER, MORE PROFITABLE MESH BUSINESS

with **WAFIOS** *AUTOMATIC CHAIN LINK*

WIRE MESH MACHINES

TYPE VEF/10 SINGLE SPIRAL AUTOMATIC

The single spiral chain link automatic VEF/10 as illustrated, is designed for manufacture of small mesh, square or diamond shape netting, knuckled on both sides. All operations such as weaving, cut-off, knuckling, counting and winding-up are completely automatic.



SPECIFICATIONS:

Mesh width from 3/16" to 3/4" in wire sizes from .025" to .047" maximum, with weaving width up to 60" maximum.

OUTPUT:

Diamond 3/8" mesh x 4" wide x .031" wire: 54 square feet per hour at 1,000 RPM, 80 square feet per hour at 1,500 RPM.

Write for catalog and complete information about the VEF/10 and our complete line of single spiral diamond and round mesh machines, and double spiral chain link automatic wire fence machines.

SUITABLE FOR FIRE SCREENS, CONVEYOR BELTING, NETTING & CONTAINERS FOR THE FISHING INDUSTRY

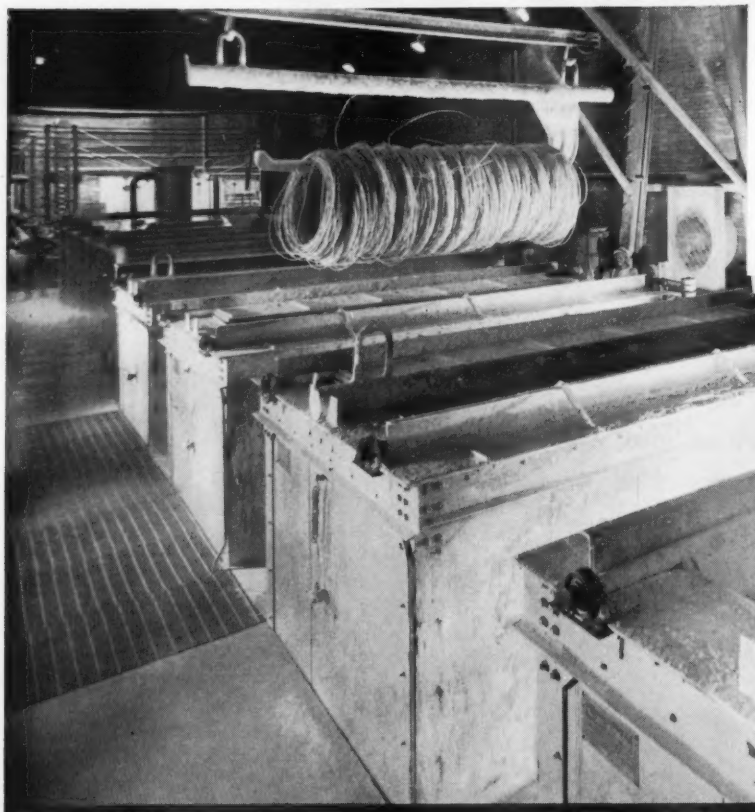
WAFIOS
MACHINERY CORP.
335 HUDSON STREET
HACKENSACK, N. J.

WAFIOS
MAKES THEM ALL!

THE WORLD'S MOST COMPLETE LINE.

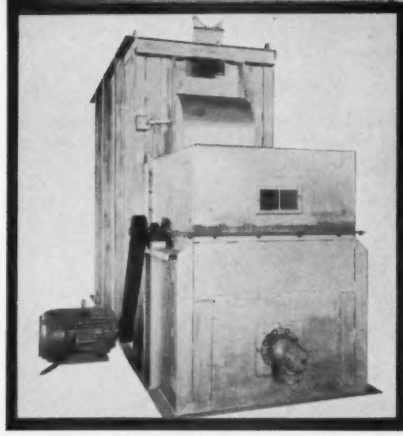
WAFIOS
MASCHINENFABRIK
Wagner, Ficker & Schmid
REUTLINGEN/WURTT., GERMANY

carl mayer Designs, Builds and Installs all Types of ROD BAKERS

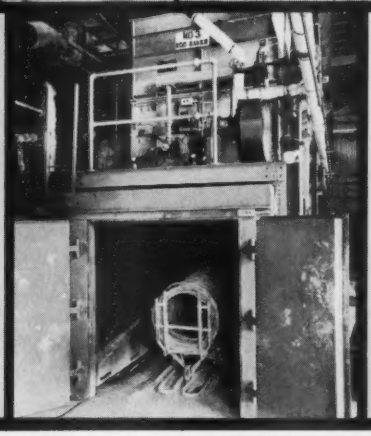


Carl Mayer Hi-Speed Rod Bakers, Tunnel Bakers, Continuous Bakers and specials . . . are now in service all over the world.

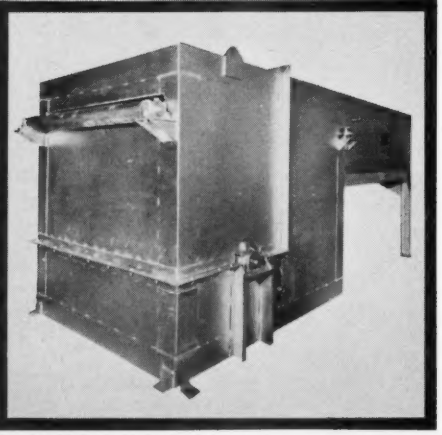
HI-SPEED ROD BAKER—with greater fuel economy and maximum efficiency resulting from exclusive heating arrangement and counter-balanced doors. Patented blow off feature for excess moisture removal.



PIT TYPE BAKER—with open top. Direct oil or gas fired heating. High capacity blowers.



TUNNEL BAKER—Indirect, oil or gas fired heating system. Positive temperature control. 6' 10" wide x 7' high x 40' 8" long—Capacity 6,000 lbs. per hour.



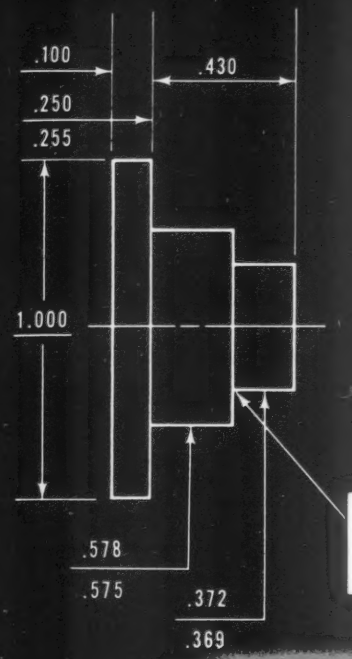
CONTINUOUS BAKER—used for either drying lime coating on wire continuously, or strip paint drying. Direct gas fired, recirculating heating.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
Driver-Harris Co.
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
Steel Company of Canada
Thompson Wire Company
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp.

Write for Literature

THE carl mayer CORP.
20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO
OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories



inside corners

SHARP AS POSSIBLE

KEYSTONE WIRE *flowability* does it!

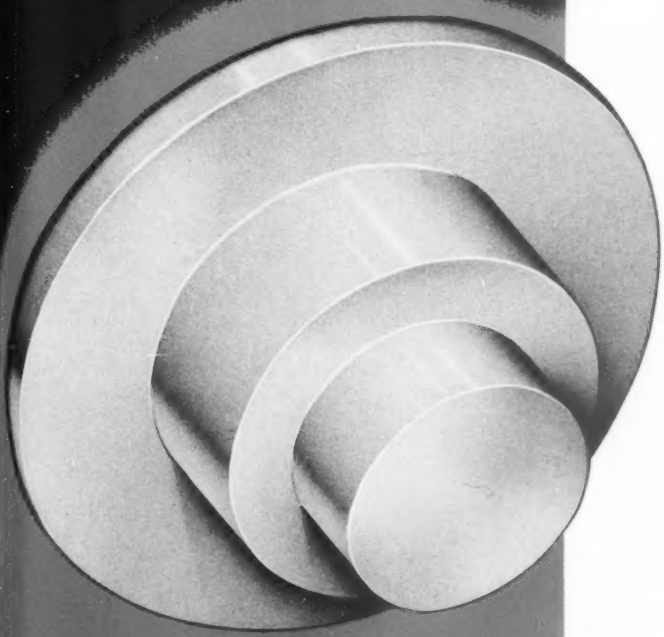
"Inside shoulders as sharp as possible," read the specifications for this shoulder rivet used in an automobile door assembly.

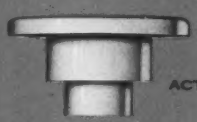
"Rockford"® Screw Products Co., Rockford, Illinois, makes this part from Keystone Direct Drawn Heading Quality Wire. In three blows, original .488″ diameter wire is extruded to .379″ diameter and severely upset to 1″ diameter. The head is consistently formed without cracking while holding to head diameter tolerances of ±.010″.

This special part, now made exclusively from Keystone Wire, is the result of extensive wire study. The flowability of this Keystone Wire allows the metal to completely fill the closed dies and achieve these sharp inside corners. Correct chemical analysis and closely controlled finish add to the successful cold heading of this shoulder rivet.

Our trained metallurgists and technicians are available to help solve your wire problems. Send us your specifications and we shall recommend the best steel analysis for you.

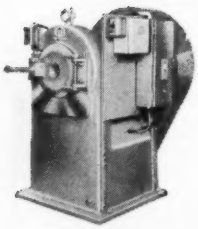
Keystone Steel & Wire Company, Peoria, Illinois



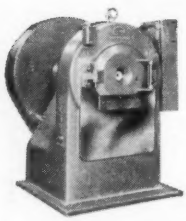


KEYSTONE
WIRE FOR INDUSTRY
MADE AT PEORIA, ILLINOIS, U.S.A.

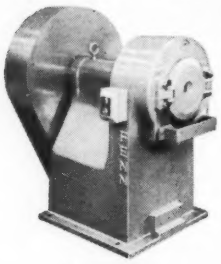
ARE YOU MACHINING WHEN YOU SHOULD BE SWAGING?



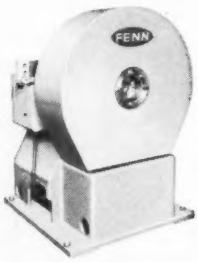
Rotary Two-Die



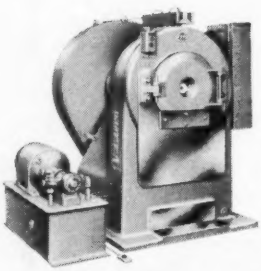
Rotary Four-Die



Long Die



Stationary Die



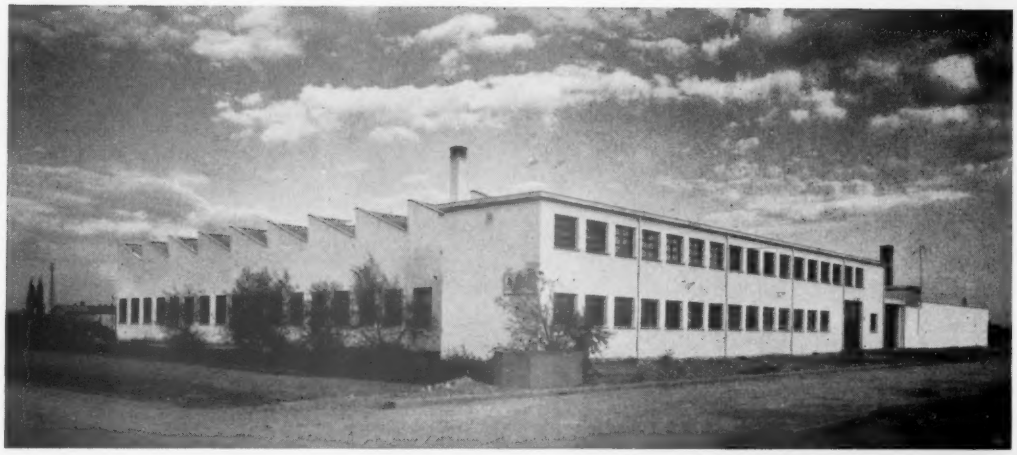
Hydroformer

Cost conscious manufacturers are finding it extremely profitable to design the components of new products . . . or redesign old ones . . . for production on Fenn swaging machines. What's more, in many cases swaging makes it better. On the *money saving* side, here are important considerations. Low investments in both machines and dies, the absence of chips with resulting savings in both metal and chip handling, lower labor costs because highly skilled operators are not required, and savings in time . . . for swaging is simple in operation, whether manually or mechanically fed. On *making it better*, swaging improves the physical characteristics of the metal, imparts a high finish, maintains continuous accuracy to within $\pm .001''$, and performs many operations possible by no other method. Your nearest Fenn sales engineer can competently advise you on possible application to your product.

For complete guide to rotary swaging and technical data on the Fenn line, write for Catalog SM-60. The Fenn Manufacturing Company, Fenn Road, Newington, Connecticut.

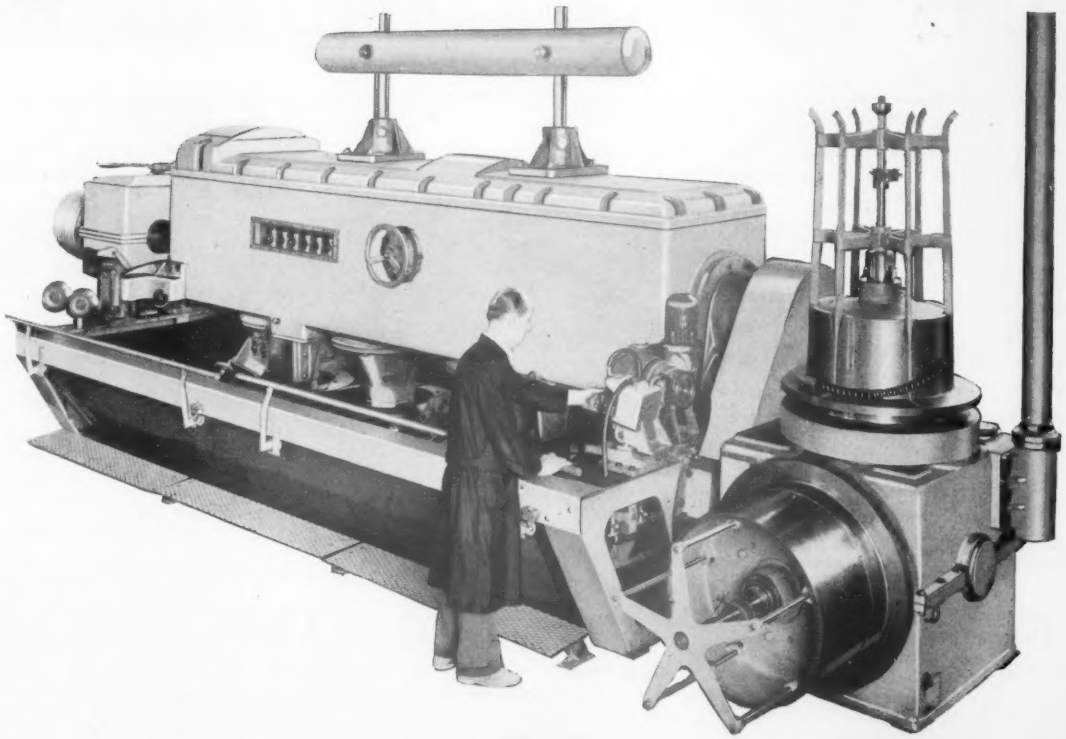
Only FENN *makes all types of swaging machines*

"SAMP"



Multiwire drawing machine – UNIVERSAL model MM-1/T

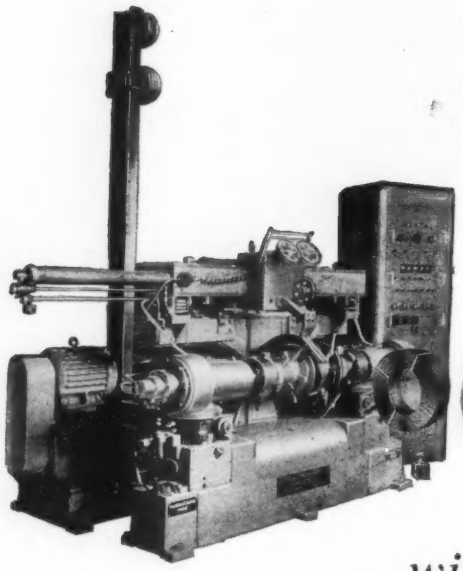
for drawing Trolley wires etc.



Soc. p. Azioni
Meccanica di
Precisione

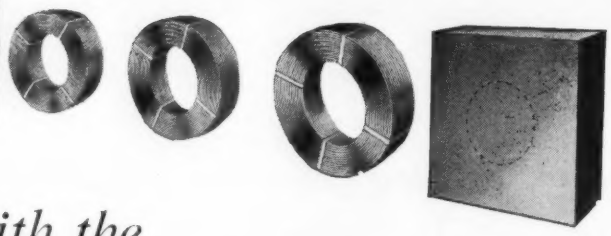
S.A.M.P.

Bologna
(Italy)
Via Galliera 12
telef. 235400
227400



CONTINUOUS COILING AND PACKAGING

direct from your process line



with the

TA15 CONTINUOUS COILER (Available in U.S.A.)

- A compact combination of the latest techniques in mechanical, pneumatic and electronic engineering.
- Completely self contained. Will follow process line automatically without interlock connections.
- Four completed coils per minute.
- Complete and automatic checking, with automatic handling into individual boxes and automatic faulty coil rejection.
- Accurate length control, quickly changed for varying coil sizes and sections.
- Powered cutting.
- Tight, well layered coils.
- Automatic spray and oil bath lubrication.
- Automatic interlocks to keep down-time to a minimum.
- Machine tool construction.

This continuous coiling version of the 'TA.15' has been subjected to, and perfected under, continuous production conditions for two years, with the co-operation of one of our customers, Les Cables de Lyon, France.

'TA.15's' are now operating, and are being installed in North America and most of the major countries of Europe.

North and South America,
Manufacturing Associates, Michigan Oven Co., Detroit, U.S.A. All products.

France.
Licensed manufacturers, Les Cables de Lyon, Bezons. 'TA.15' only.

All inquiries are welcomed and our engineers are available to assist you in planning your automatic plant.

Return the coupon below to —

GENERAL ENGINEERING CO (RADCLIFFE) LTD

Bury Road, Radcliffe, Manchester, England

GENERAL
GENERAL ENGINEERING CO (RADCLIFFE) LTD

Telephone: Radcliffe 2291

Please send me details of the TA15 Continuous Coiler.

FIRM.....

ADDRESS.....

NAME.....

W W P

NORTHWESTERN . . .

your dependable supplier of

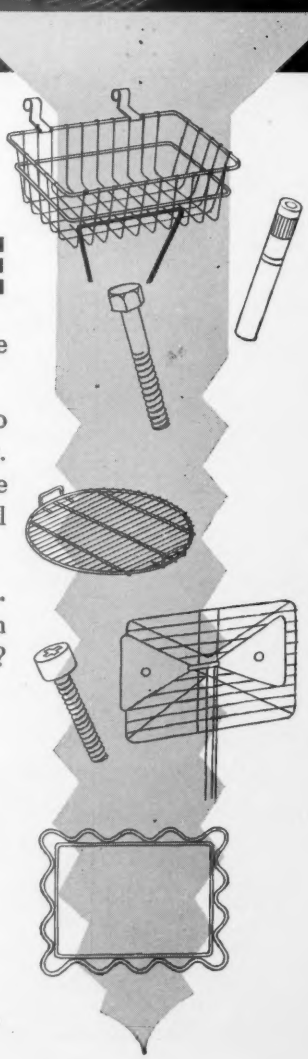
MANUFACTURERS' WIRE

Consider making Northwestern your "partner" in fabricating the products or component parts you sell.

Let us show you how our 82 years of experience enables us to provide the *right* temper and *right* finish to *exact* size specifications. Let us work with you to provide standard or special purpose qualities, or custom wire to be developed by our metallurgical staff to meet your exact needs.

Present users with whom we are "partners" report longer die life . . . greater production efficiency . . . better quality of product when working with Northwestern wire. May we be equally helpful to you?

All Northwestern wire is made exclusively from electric furnace carbon steel.



ELECTRIC STEEL
SINCE 1870

Northwestern

STEEL AND WIRE COMPANY
STERLING, ILLINOIS

Telephone MAin 5-2500 — T.W.X. STLG-ILL-7668

THESE ARE AMONG THE MANY FINISHES WE PRODUCE: GALVANIZED • POT ANNEALED • BRIGHT • EXTRA SMOOTH CLEAN BRIGHT • ANNEALED (LIME, BRIGHT, BLACK)

Quality plus economy when you buy SUMITOMO steel wire rods

Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods. Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month. To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.

Dimensions of Sumitomo Wire Rods

Diameter 5mm. (13/64") — 16mm. (5/8")
Weight Single Bundle
about 270 kgs. — 320 kgs.
600 lbs. — 700 lbs.
Compressed Bundle (6 coils)
about 1,620 kgs. — 1,920 kgs.
3,600 lbs. — 4,200 lbs.
Coil Dimensions on Request

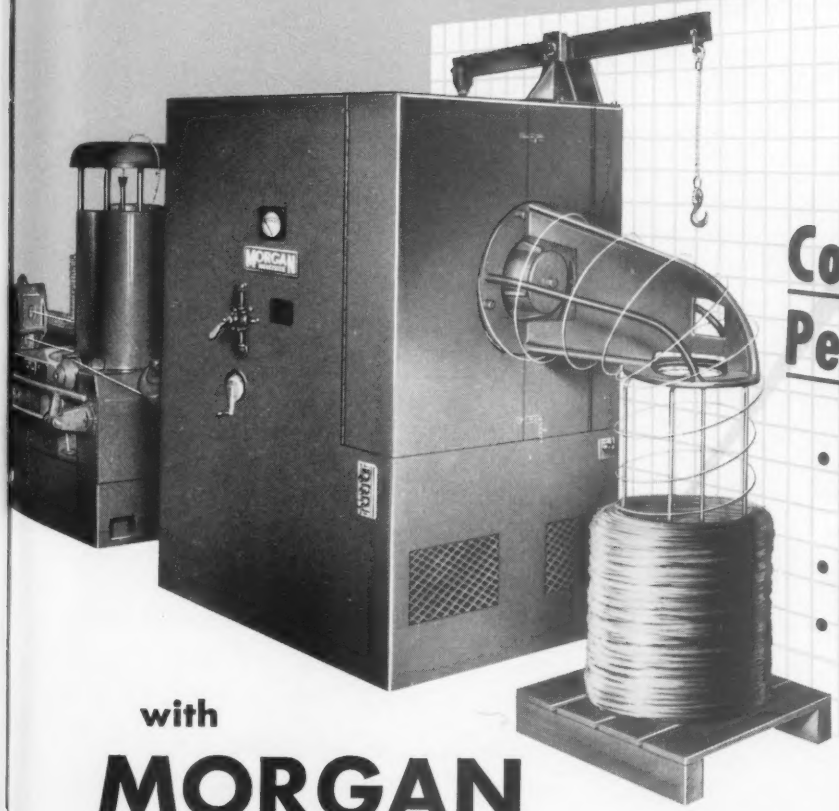
LEADING PRODUCERS OF STEEL WIRE RODS, PIPE AND ROLLING STOCK PARTS

SUMITOMO METAL INDUSTRIES, LTD.

Head Office: Osaka, Japan
Cable Address: "SUMITOMOMETAL OSAKA"

New York Office: 420 Lexington Ave., New York 17, N.Y.
Cable Address: "SUMITMETAL NEWYORK"

Get Heavy Weight Bundles and Non-Stop Drawing



Continuous Peak Production

- Ability to Precision Cast High or Low Carbon
- Extra Large Bundles
- Fits Any Installation

with

MORGAN Wire Drawing Dead Block

Adaptability is the key feature of the New Morgan Wire Drawing Dead Block—its non-integrated design permits its use with any type of wire drawing machine for additional high-speed draft or coiling only. You get additional advantages such as: No down-time for stripping—Low scrap loss—Increased production—Reduced handling and in-plant transportation costs—Low maintenance cost. Write for details on the full line of Morgan Wire Drawing Equipment.

MORGAN WORCESTER

MORGAN CONSTRUCTION CO.

WORCESTER, MASSACHUSETTS

ROLLING MILLS • MORGOIL BEARINGS • WIRE DRAWING MACHINES • COMBUSTION CONTROLS

YAWATA STEEL. YAWATA STEEL

ACROSS THE SEAS TO WORLD MARKETS

Wire Rods of extremely high quality are produced by YAWATA for satisfied users throughout the world.

YAWATA, the biggest IRON and STEEL operation in the Far East, has the equipment and the knowhow to produce STEEL products of high quality and dependability.

When buying steel from JAPAN, specify YAWATA.

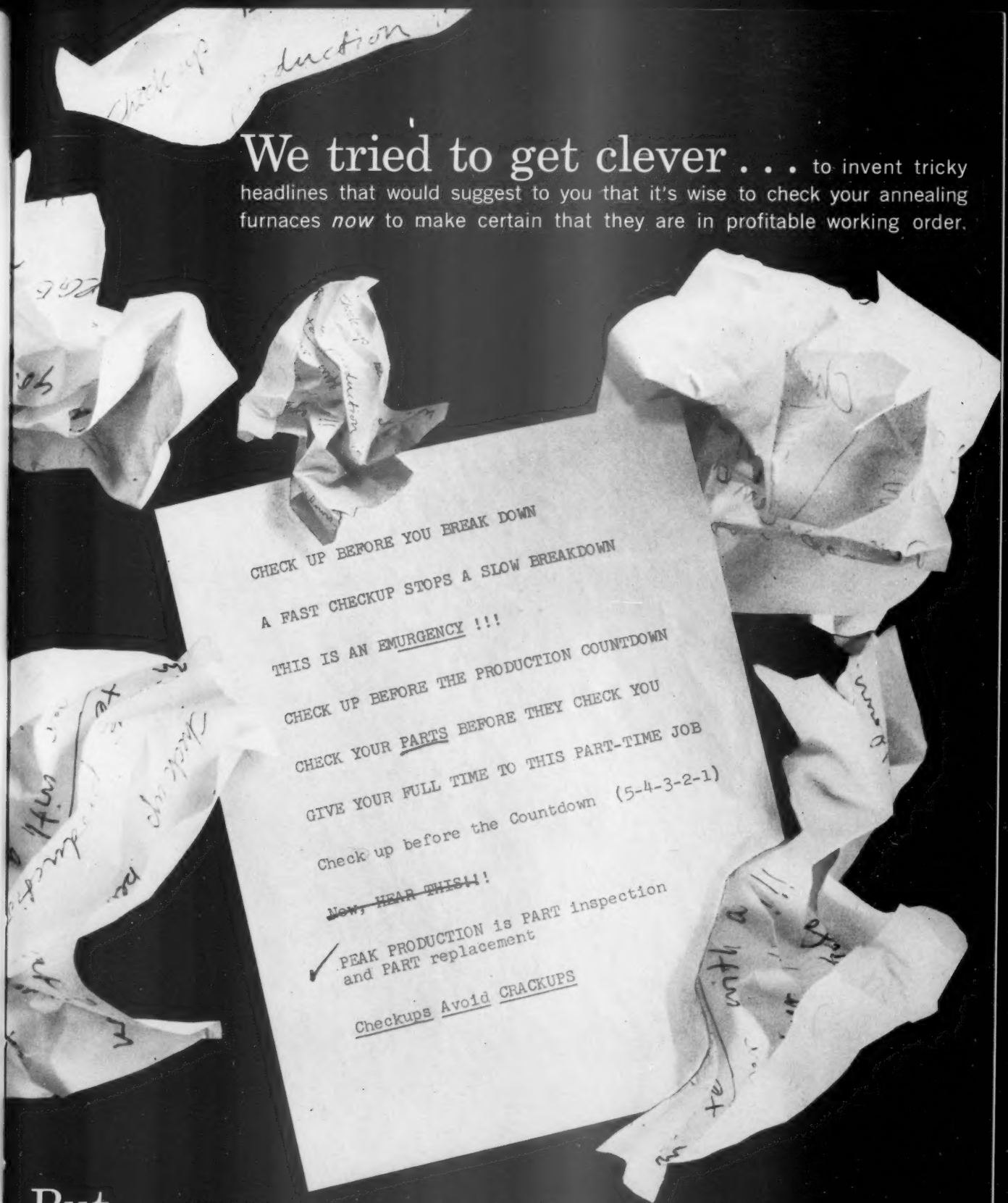
YAWATA IRON & STEEL CO., LTD.

Head Office: No. 1, 1-chome, Marunouchi, Chiyoda-ku, Tokyo, Japan
Cable Address: YAWATASTEEL TOKYO

European Office: Immerman Strasse 15, Duesseldorf, West Germany
Tel: 1-0463 Cable Address: YAWATASTEEL DUESSELDORF

American Office: Room 2009, Seagram Building., 375 Park Ave., New York, 22, N.Y., U.S.A. Tel: Murray Hill 8-3327
Cable Address: YAWATAISCO NEWYORK

We tried to get clever . . . to invent tricky headlines that would suggest to you that it's wise to check your annealing furnaces *now* to make certain that they are in profitable working order.


CHECK UP BEFORE YOU BREAK DOWN
A FAST CHECKUP STOPS A SLOW BREAKDOWN
THIS IS AN EMURGENCY !!!
CHECK UP BEFORE THE PRODUCTION COUNTDOWN
CHECK YOUR PARTS BEFORE THEY CHECK YOU
GIVE YOUR FULL TIME TO THIS PART-TIME JOB
Check up before the Countdown (5-4-3-2-1)
Now, HEAR THISH!
PEAK PRODUCTION is PART inspection and PART replacement
Checkups Avoid CRACKUPS

But . . . after looking over our efforts, we decided the best approach would be a straight reminder that better business is being forecast – and to urge you to make sure your annealing equipment is in first-class condition to take full advantage of busier days. Our Parts Department can fill your order promptly.

Lee Wilson Engineering Co., Inc., 20005 Lake Road, Cleveland 16, Ohio.

Lee Wilson

ORIGINATORS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES

Where can I find it?

Look in the BUYERS' GUIDE for your answer

DO YOU have a copy of the 1961 WIRE AND WIRE PRODUCTS BUYERS' GUIDE on your desk for ready reference when you need it?

The 1961 Edition contains literally thousands of changes — of names, addresses, products, etc.

It will tell you quickly who manufactures all kinds of wire machinery, equipment and supplies; who makes different kinds of rod, bar, wire, wire products, strip, billets; and who produces various types of electric wire and cable.

In addition, in the Year Book section, it gives you:

HISTORY OF WIRE ASSOCIATION ACTIVITIES IN 1960

CONSTITUTION AND BY-LAWS OF THE ASSOCIATION

OFFICERS, DIRECTORS AND COMMITTEES FOR 1961

LISTS OF ASSOCIATION MEMBERS BY INDIVIDUALS AND COMPANIES

INDEX TO ARTICLES AND SUBJECTS PUBLISHED IN WIRE AND WIRE PRODUCTS IN 1960

LISTS OF AWARDS PRESENTED FOR MERITORIOUS PAPERS

Every wire man needs this new BUYERS' GUIDE. It is the only directory in the U.S.A. published exclusively for the Wire Industry— a real gold mine of information!

PRICE: $5.00 EACH; $3.00 TO SUBSCRIBERS TO WIRE AND WIRE PRODUCTS. PUBLISHED MAY 1st.

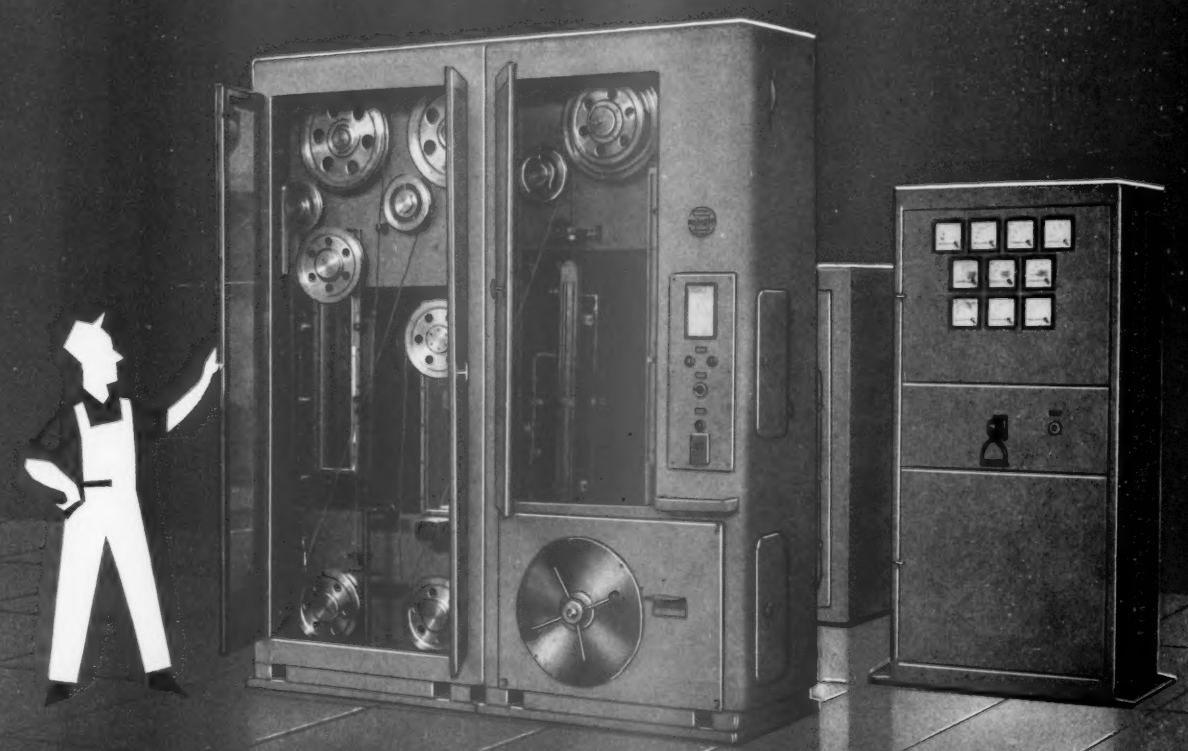
Order the Revised 1961 Edition Today from

WIRE AND WIRE PRODUCTS

453 MAIN STREET
STAMFORD, CONNECTICUT

NEW DEVELOPMENTS CONTINUE!

Large Continuous Electric Annealer VG 85 to be worked in combination with any copper rod break down machine, for bright annealed finished wire, for sizes between .14" and .068". Finishing Speeds up to 3000 to 4000 ft/min.



AMERICAN LAUBSCHER Corporation
FISK BLDG. 250 WEST 57th STREET NEW YORK 19, N.Y.
EXCLUSIVE REPRESENTATIVES FOR U.S.A. AND CANADA

NIEHOFF

NIEHOFF MACHINE WORKS

SCHWABACH NEAR NURNBERG WESTERN GERMANY

The Annual Convention
of
THE WIRE ASSOCIATION

October 22-26, 1961, French Lick-Sheraton Hotel, French Lick, Ind.

TENTATIVE PROGRAM SCHEDULE

Sunday Evening, October 22

President's Reception to Members
Registration Desk opens at 2:00 P.M.

Monday, October 23

10:00 A.M. — Meeting of Board of Directors
12:30 P.M. — Directors' Luncheon to Program Participants
2:00 P.M. — Joint Opening Session
1. President's Address of Welcome
2. Mordica Memorial Lecture
3. Technical Papers of General Interest
4. Annual Meeting of Association Members

8:30 P.M. — Horse Racing

Tuesday, October 24

9:00 A.M. — Technical Sessions for the Three Divisions — 4 papers each.
1:30 P.M. — Meeting of the Electric Wire & Cable Management Committee. Otherwise free for recreational activities.

Wednesday, October 25

9:00 A.M. — Technical Sessions for the Three Divisions — 4 papers each.
Afternoon — Open for recreational activities
6:00 P.M. — Hospitality Hour (Pay-as-you-go basis)
7:00 P.M. — Annual Banquet
1. Presentation of Awards
2. Presentation of 25-Year Certificates
3. After-Dinner Address

Thursday, October 26

Convention closes. Guests free to leave for home. *No further official activities.*

All meals and rooms are included in the hotel's American Plan guest charges, to which will be added 15% by the hotel to cover gratuities.

Registration Fee: Members $15.00 — Guests $18.00 — Ladies $5.00

This first Annual Convention in a resort hotel promises to be a highly interesting and refreshing change from our routine procedure of meeting in one of the larger industrial cities. We shall welcome all wire men, whether members or guests.

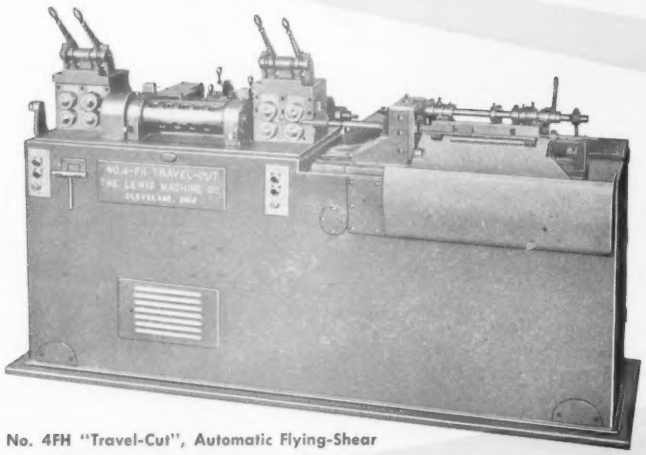
THE WIRE ASSOCIATION

Richard E. Brown, Executive Secretary

453 Main Street **Stamford, Conn.**

500 Feet Per Minute!

With a Lewis Wire Straightening and Cutting Machine



No. 4FH "Travel-Cut", Automatic Flying-Shear Wire Straightening and Cutting Machine designed for high-speed cutting. Capacity in mild steel, 3/32" to 1/4" . . . high carbon, alloy and stainless 3/16" maximum.

The Lewis No. 4FH is typical of the new developments Lewis engineers have perfected to meet tomorrow's production schedules today. For example, the amazing No. 4FH, designed for straightening and cutting short lengths, can produce 18,000, 12"–18" lengths of 1/4" welding rod per hour.

Now, Lewis announces a further development, the new No. 4FHA, designed for straightening and cutting any length at speeds up to 500 FPM. The No. 4FHA is a high-speed Travel-Cut Flying-Shear model equipped with Air Clutch and Air Brake.

A compound sliding gear transmission has six flywheel speeds and 20 feed speeds through the range of 75 to 520 FPM, permitting the selection of the correct speed for various diameters and materials.

There are 46 models in the Lewis line designed to handle wire from .012" to 1" in diameter. Write us . . . we have a machine to meet any wire straightening and cutting requirement.

THE LEWIS MACHINE COMPANY 3441 East 76th Street • Cleveland 27, Ohio
A Division of Curtis Mfg. Co.

THE ELECTRIC WIRE & CABLE SECTION
of
THE WIRE ASSOCIATION

The committee, appointed by the Association's Board of Directors, the Electric Wire and Cable Management Committee, extends to all persons interested in and concerned with the production of insulated wire and cable a cordial invitation to join with them in promoting the progress of this branch of the wire industry. This Management Committee, as of April 26, 1961, is comprised of:

CHAIRMAN

Clement C. Lawson, Plant Facilities Eng.
Bell Telephone Laboratories, Inc.
Murray Hill, N. J.

MEMBERS

David Barr, Plant Eng.
National Electric Div.
H. K. Porter Co.
338 14th Street
Ambridge, Pa.

Grover W. Brown, Mgr.
Machinery Devel.
The Okonite Co.
Passiac, N. J.

Walter H. Dahlstrom
Chief Research Eng.
American Steel & Wire Div.
United States Steel Corp.
767 Millbury St.
Worcester, Mass.

J. J. Dowling, Pres.
Philadelphia Insulated Wire Co.
New Albany Road
Moorestown, Conn.

Charles M. Fredrickson, Technical Mgr.
Olin Conductors Metals Div., Olin
P. O. Box 989, Chattanooga, Tenn.

Alfred Garshick, Devel. Eng.
Boston Insulated Wire Co.
65 Bay St., Boston 25, Mass.

J. K. Gillett, Pres.
Industrial Equipment Co.
Box 706, Englewood, N.J.

Duncan M. Gillies, Pres.
Duncan M. Gillies Co.
66 Central St.
West Boyleston, Mass.

Elmer J. Goetz, Genl. Mgr.
Federal Wire & Cable Co., Ltd.
Div. of H. K. Porter Co.
Guelph, Ont., Canada

James S. Higgins, Plant Eng.
Copper Div.
Walker Brothers
Conshohocken, Pa.

Alexander A. Kerr, Supt., Prodn.
Reynolds Metals Co.
Chester, Pa.

C. L. Kessler, Chief Works Met.
Aluminum Company of America
P. O. Box 150, Massena, N. Y.

Urbain J. H. Malo, Technical Dir.
Narragansett Wire Co.
1102 Main St.
Pawtucket, R. I.

Glen J. Moher, Process Eng.
Canadian General Electric Co., Ltd.
107 Park St., Peterboro, Canada

W. R. Moyers, Chief Eng.
Wire Engineering Dept.
Western Electric Co.
P. O. Station B
Buffalo 7, N. Y.

Gordon C. Rollins, V.P.-Mfg.
Superior Cable Corp.
Box 35-A, Hickory, N. C.

David M. Schmid, President
Techalloy Co., Inc.
Rahns, Pa.

Benoit J. Sirois, Met. Eng.
Phelps Dodge Copper Products Co.
Bayway & Front Sts.
Elizabeth, N. J.

Michael M. Suba, Mgr. Extrusion Mkts.
Union Carbide Plastics Co.
270 Park Ave., New York 17, N. Y.

J. E. Thomas, Mgr., Brockville Div.
Phillips Electrical Co., Ltd.
Brockville, Ont., Canada

Harry E. Thompson
Consulting Cable Engineer
Anaconda Wire & Cable Co.
Hastings-on-Hudson, N. Y.

Dr. Robert C. Williams
Vice-Pres.-Research
The Ironsides Co.
270 W. Mound St., Columbus 15, Ohio

The committee arranges for papers for regional meetings and the Annual Convention, reviews them to see that they are desirable as to subject matter and quality, and formulates policies that will promote the best interests of insulated wire production personnel. Recent authorization to increase the membership to twenty-five will be implemented by further appointments in the near future.

You are invited to send for a booklet describing the activities of The Wire Association and a membership application card.

THE WIRE ASSOCIATION

RICHARD E. BROWN, EXECUTIVE SECRETARY

453 Main St. **Stamford, Conn.**

Your Insulation Material Engineered to Your Specifications

RUBBER ···· VINYLS or other POLYMERS ?

Kenflex® RESINS

TRADE MARK

SOLID OR LIQUID

KENFLEX® and KENMIX® dispersions are extensively recommended for wire and cable compounding by manufacturers of Butyl and Neoprene.

KENFLEX® resins impart excellent electrical properties and moisture resistance to your wire insulation. They are particularly beneficial in compounds for:

NEOPRENE ..... for retarding crystallization.
HYPALON ..... for easy dispersion of litharge.
BUTYL ..... for outstanding ozone resistance.
VINYLS ..... for fast fluxing.
NITRILE & NITRILE-VINYL COPOLYMERS ..... for fast fluxing, ozone resistance and mold flow.

Material For Your Information

BULLETINS:

Nitrile	No. 1
Butyl & Hypalon	2
Neoprene	3
Vinyls	4
Kenmix dispersions	6

KENRICH PETROCHEMICALS, INC.
57-02 48th STREET, MASPETH 78, NEW YORK

Technical Papers for . . .

THE ANNUAL CONVENTION of THE WIRE ASSOCIATION

October 22-25, 1961, French Lick-Sheraton Hotel, French Lick, Indiana

There still is opportunity for those who are willing to present papers to volunteer. Papers may be placed in any of these categories:

- **FERROUS ROD, WIRE OR WIRE PRODUCTS**
- **NON-FERROUS MECHANICAL WIRE OR WIRE PRODUCTS**
- **ELECTRIC WIRE AND CABLE**

The title of the proposed paper and a brief summary of what you propose to cover should be sent to the Program Committee Member nearest you.

General Program Chairman: John L. Sanderson, Supt., Wire Mill, Keystone Steel & Wire Co., Peoria 7, Ill.

Ferrous Program Committee

Chairman: John L. Corson, Mgr., Webb Wire Div., The Carpenter Steel Co., 17 Liberty St., New Brunswick, N. J.
Member: Allan B. Dove, Product Devel. Met., Steel Company of Canada Ltd., Hamilton, Ont., Canada (Canada).
Member: John Rigby, Dir., John Rigby & Sons Ltd., Low Moor, Bradford, England (England & Europe).
Member: H. H. Passolt, Chief Met., Johnson Steel & Wire Co., 53 Wiser Ave., Worcester, Mass: (New England).
Member: Carleton W. Garrett, Met. Eng., Prod. & Devel. Div., Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa. (N. Y., N. J., Pa., Md. & Del.).
Member: William Mohr, Works Mgr., Pacific Coast Div., Colorado Fuel & Iron Corp., 1080 19th Ave., Oakland, Cal. (West Coast).
Member: Theodore B. Dull, Supt., Wire Mills, Sheffield Div., Armco Steel Corp., Kansas City 25, Mo. (South, Southwest and Mexico).
Member: William O. Trownsell, Chief, Dept. of Met. & Inspect., Continental Steel Corp., Kokomo, Ind. (Central States West to Rockies).
Member: Walter B. McShane, Chairman, Wire Committee, American Steel & Wire Div., U. S. Steel Corp., Rockefeller Bldg., Cleveland 13, Ohio, (American Steel & Wire Plants).
Member: Fred A. Webber, Chief Met., Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., Station B., Buffalo 7, N. Y. (C. F. & I. Plants).
Member: H. P. Raffensperger, Asst. Met. Eng., Bethlehem Steel Co., Bethlehem Pa. (Bethlehem Steel Plants).
Member: Howard J. Godfrey, Asst. Chief Devel. Eng., John A. Roebling's Sons Div., Colorado Fuel & Iron Corp., Trenton 2, N. J. (Roebling Plant).

Non-Ferrous Program Committee (Mechanical Wire Section)

Chairman: Charles M. Fredrickson, Tech. Mgr., Olin Conductors, Metals Div., Olin, Box 989, Chattanooga, Tenn.
Member: Earle W. Lovering, Met. Eng., Scovill Mfg. Co., 99 Mill St., Waterbury 20, Conn.
Member: Harold L. Schilling, Prod. Eng. & Devel. Supvr., Kaiser Aluminum & Chemical Corp., Box 671, Newark, Ohio.
Member: Carl L. Sherman, Met., Phillips Electrical Co. Ltd., Brockville, Ont., Canada.
Member: Roger J. Schoerner, Vice Pres., Southwire Corp., Fertilla St., Carrollton, Ga.
Member: Benoit J. Sirois, Dir. of Res., Phelps Dodge Copper Products Corp., Bayway & S. Front St., Elizabeth, N. J.

Electric Wire & Cable Program Committee

Chairman: W. R. Moyers, Chief, Wire Eng. Dept., Western Electric Co., P. O. Sta. B, Buffalo 7, N. Y.
Members: All members of the Electric Wire & Cable Management Committee.

May we count on your cooperation?

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

453 Main Street **Stamford, Conn.**

FOR WIRE ROD THAT'S REALLY FINE--

say NIEDERRHEIN

Niederrhein means Quality

Niederrhein, Europe's largest wire rod facility, with its completely modern installations assures close tolerances for diameter and out-of-round, excellent surface and light scale.
Users report exceptionally good mechanical descaling properties.

Open Hearth grades from C 1005—1095
Low Metalloid
Thomas (Basic Bessemer) grades
Sizes from .200" —½"
Coils from 180—880 lbs.
Inside diameters 20, 24, 26, 33½"
Unitized bundles of 3000 lbs. are now our standard shipping package
Reliable delivery schedules at a fair price

KURT ORBAN
COMPANY, INC.

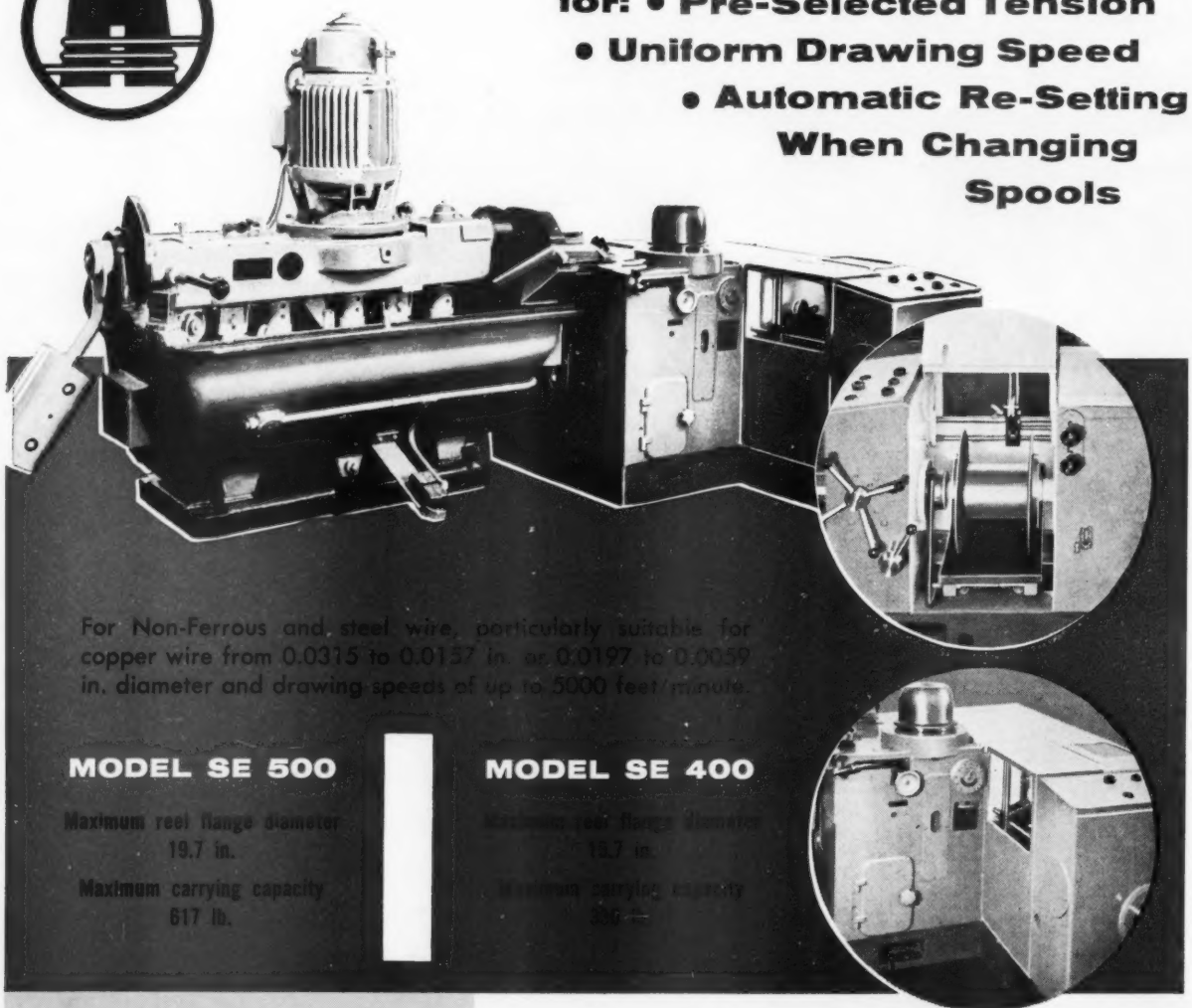
34 A Exchange Place. Jersey City 2, N. J.
In Canada: Kurt Orban Canada. Ltd.,
Toronto & Vancouver

HERBORN presents

A NEW SPOOLER!

MODEL SE 500 • MODEL SE 400

for: • Pre-Selected Tension
• Uniform Drawing Speed
• Automatic Re-Setting When Changing Spools



For Non-Ferrous and steel wire, particularly suitable for copper wire from 0.0315 to 0.0157 in. or 0.0197 to 0.0059 in. diameter and drawing speeds of up to 5000 feet/minute.

MODEL SE 500	MODEL SE 400
Maximum reel flange diameter 19.7 in.	Maximum reel flange diameter 19.7 in.
Maximum carrying capacity 617 lb.	Maximum carrying capacity 330 lb.

HERBORN
MACHINERY CORP.
335 HUDSON STREET, HACKENSACK, N.J.

Maschinenfabrik Herborn - Berkenhoff & Drebes A.-G. Herborn/Dillkreis (Germany)

The drive of the coiler is directly coupled to the Herborn Wire Drawing Machine to ensure synchronous stopping and starting of both wire drawing machine and spooler.
Pre-selected tension and uniform drawing speeds are obtained by an adjustable tension balance.
After the spools are changed, the unit is automatically adjusted to the starting speed, irrespective of the core diameter of the new, empty reel. The wire traversing speed depends on the reel speed and is steplessly variable.
All controls for the Spooler and the wire drawing machine are accuated from the control desk of the spooler.

This lightweight "No Charge" spool is typical of Roebling's modern packaging methods that save customers time and money.

Are You Getting What You Pay For?

When you pay for HIGH QUALITY high-carbon wire, you want to be sure you get it. You do, when it is supplied by Roebling.

It is unsurpassed in quality, consistently true to specifications, and absolutely uniform in gauge. Hundreds of manufacturers attest to this fact... the qualities that they *pay* for — they *get* in Roebling high-carbon wire. The length of our relationship with customers proves it.

We'll be glad to show you what we mean. For information on superior high-carbon wire or cold rolled strip, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

ROEBLING

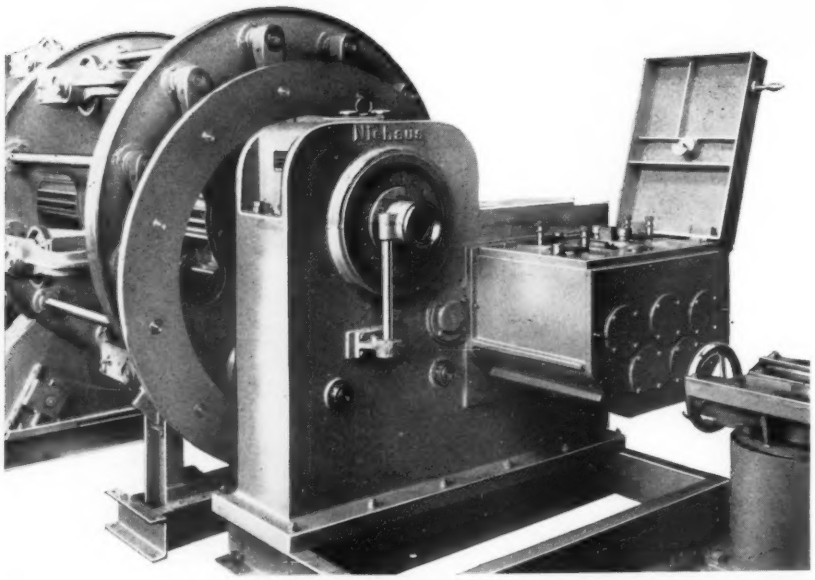
Branch Offices in Principal Cities
John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

NIEHAUS

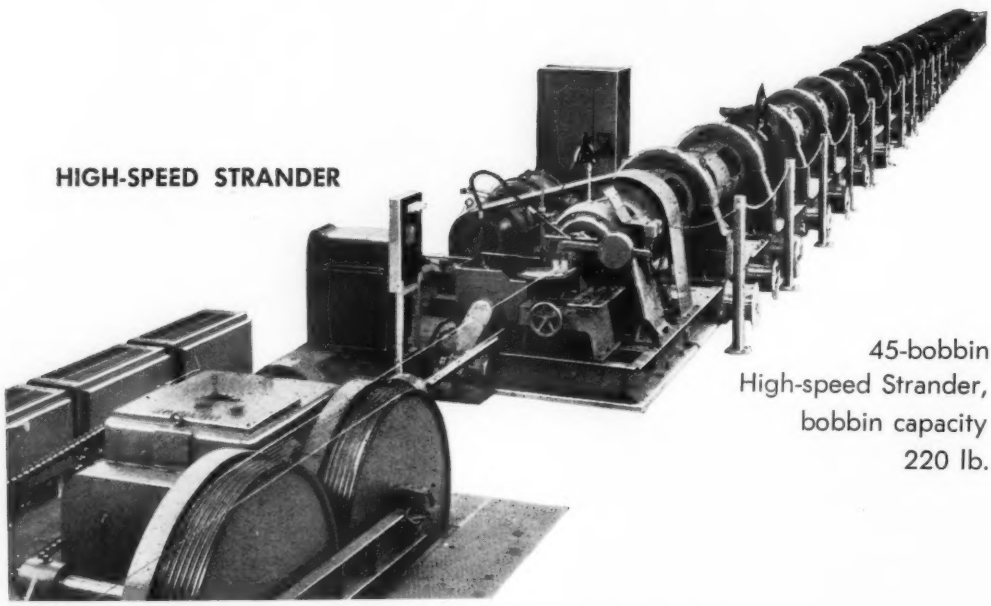
ELECTRIC-CABLE MACHINERY • WIRE-ROPE MACHINERY

PLANETARY STRANDER



We manufacture: Stranding and Rope-closing Machines of tubular and planetary design, of any size and for any number of bobbins, as well as the pertinent auxiliary machinery and equipment.

HIGH-SPEED STRANDER

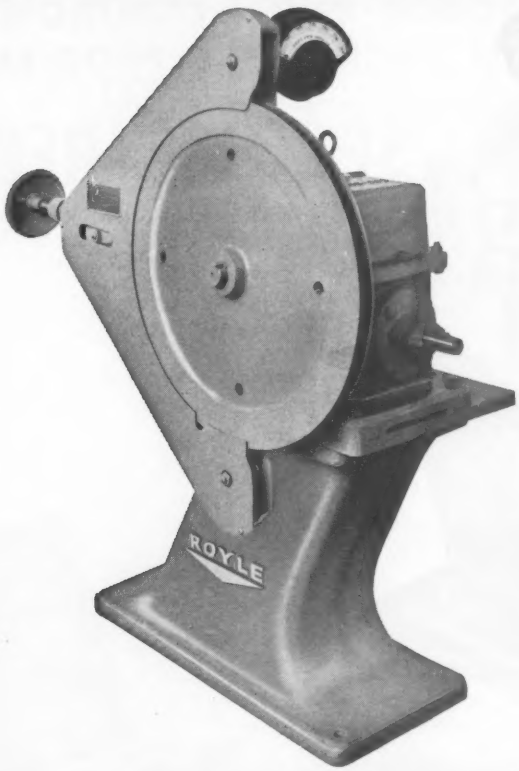


45-bobbin High-speed Strander, bobbin capacity 220 lb.

MASCHINENFABRIK K. A. NIEHAUS • DUSSELDORF-RATH

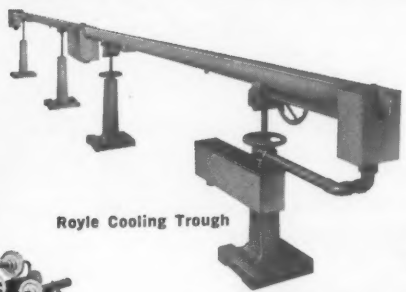
Sole Representative: Paul Reicher Machinery & Equipment, Ltd., 600 Eglinton Ave., East, Toronto 12, Ont., Canada

CAPSTANS and COOLING TROUGHS

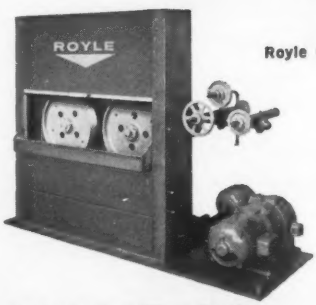


6 sizes . . . 24", 36", 48", 60", 72", 84"
Spring Tensioning
Rubber covered wheels
Long lasting nylon belts
Space saving—180° reversal

Royle Hi-Speed 24" Belt Wrap Capstan



Royle Cooling Trough



Royle 20" Dual Wheel Capstan

Royle Engineered Cooling Trough systems are temperature regulated for exact, controlled rate of cooling.

Royle Heavy Duty Dual Capstans provide extra cooling in limited space. Sizes: 16", 20", 24", 30", 36", 48" and 60".

Pioneered the Continuous Extrusion Process in 1880

Home Office, V. M. Hovey, J. W. VanRiper, SHerwood 2-8262. **Akron, Ohio,** J. C. Clinefelter Co., BLackstone 3-9222. **Downey, Cal.,** H. M. Royal, Inc., TOpaz 1-0371. **London, England,** James Day (Machinery) Ltd., Hyde Park 2430-0456. **Tokyo, Japan,** Okura Trading Company, Ltd., (56) 2130-2149.

John Royle & Sons, 10 Essex Street, Paterson 3, N. J.

Please, send me full information about Royle's Wire Handling Equipment.

Name_____ **Title**_____

Company_____

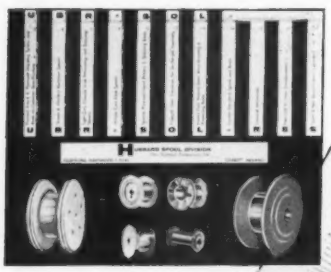
Street_____

City_____ **Zone**_____ **State**_____

HOW DO YOU MEET YOUR CUSTOMERS' DEMAND FOR IMPROVED PACKAGING?

ARE YOUR PROCESSING SPOOLS AND REELS GIVING YOU MAXIMUM CAPACITY AND EFFICIENCY?

ARE YOU REFERRING TO YOUR COPY OF HUBBARD'S NEW SPOOL AND REEL CATALOGUE WHEN CONFRONTED WITH PACKAGING PROBLEMS?



IT'S LOADED WITH IDEA STIMULATING PICTURES AND DATA AND IT'S **FREE!**

SPOOLS — REELS

FINE WIRE DRAWING SPOOLS
HARDBOARDS
NON-RETURNABLES
TAPERED BARRELS
PRECISION ALUMINUMS
HEAVY DUTY STEELS

For Your Copy, Or Packaging Help, Write Or Telephone

HUBBARD SPOOL DIVISION
Van Norman Industries, Inc.
TELEPHONE FL 7-5141 GARRETT, INDIANA

West Coast Representative: THOMPSON ASSOCIATES
Box 1143, Palos Verdes Estates, Calif. Phone: FRontier 7-4042

The Wire Outlook

A new bureaucratic threat to business has cropped up in some rulings of the Internal Revenue Service, in which the bureau has disallowed deduction as an expense of certain forms of advertising. In this the IRS is holding that money spent to influence legislation, politics or public opinion is not a legitimate business expense. Included in this category is institutional advertising.

The Timken Roller Bearing Company presently is suing the government for the recovery of $1.5 million disallowed them by the IRS for Christmas season greeting ads, for ads backing the local community fund at Canton, Ohio, for ads communicating with employees, for ads calling on citizens to fight inflation, and other ads calling for reduced government spending. The cost of broadcasts by certain newscasters sponsored by Timken was similarly disallowed. These were devoted to our fight against communism.

A bill introduced by Congressman Hale Boggs of Louisiana that would nullify the IRS ruling will help business firms to preserve their constitutional right to free speech. Time is short and everyone interested in maintaining this right should make his wishes known promptly to his Congressional representatives.

While the summer may see a flattening out of the upswing in business, most executives look for a resumption of the advance in the third quarter on a wide front. A recent survey indicates that sales and profits will be better, with inventories, prices and employment showing little change. The economy gradually is approaching pre-recession levels.

A tax reform bill now before the Congress shows little evidence of meeting the needs of the nation, the net result of the present discussions being to make downward revisions in some places that will be offset by higher taxes in others. While no action will be taken until late in the year, the greatly increased demand for money for foreign aid and the stepped-up missile program leaves little hope that taxes will go any way but up.

In the wire industry inventories are low and many buyers are evidencing more interest in placing orders. Wire mills are said to be operating now at around 65 percent of capacity. Welded wire fabrics are doing well, merchant wire products have taken a spurt and even that dormant item, barbed wire, has taken on a new lease of life.

A better demand for manufacturers' wire is developing. Automotive industry calls for high carbon wire have improved, but this will fall off temporarily during the model change-over period. Brass mills, long in the doldrums, report better business.

Many modernization programs are noted in the mills, not so much to increase production as to enable the mills to produce with greater efficiency and thus to meet competition from abroad to better advantage.

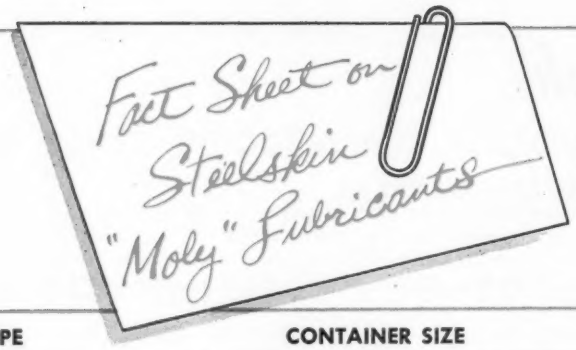
Recent increases in the price of copper to 31 cents a pound have posed problems for the copper wire mills, especially since much of it is being quoted at 32 and 33 cents by dealers. Many buyers, with good stocks on hand, are holding off on buying. Some dealers believe that copper prices are going to rise further.

Also complicating the copper wire picture are the efforts of the government to force the big integrated companies to divest themselves of their mining holdings. The theory of the government is that such ownership gives the companies concerned price advantages for their electric wire and cable subsidiaries, but the parent companies state that their subsidiaries pay exactly what an outside buyer is quoted.

A boom in business is not in prospect for another year. Economists see a gradually improving outlook for 1961, possibly bringing us up to 1959 levels, and in the coming year, barring unforeseen international complications, some new records in production and consumption are anticipated.

Edmund D. Sickels

EDITOR



Save this handy reference for ordering and using Steelskin lubricants—superior products specially developed to meet your particular lubricating needs.

TYPE	CONTAINER SIZE	USES
STEELSKIN 120-G5 Powder	Various sizes	Metallic stearate base lubricant fused with a high percentage of Molysulfide. Recommended for drawing zirconium and titanium wire and tubing, stainless steel, and rope wire.
STEELSKIN 4168 Powder	360 lbs. net fibre drums	Metallic stearate base, high titer lubricant for drawing stainless steel, valve spring wire, rope wire and other high-carbon wires.
STEELSKIN CXFR Powder	390 lbs. net fibre drums	CXH base lubricant recommended for drawing mechanically descaled nail wire and high-carbon wires.
STEELSKIN ABC-G2 Powder	300 lbs. net fibre drums	Powder containing a mixture of soaps, greases and fillers fortified with Molysulfide. For drawing coat hanger and spot welding wires.
STEELSKIN ZP-25-G Grease	700 lbs. net steel drums	Oil-type grease containing Molysulfide. Recommended for multiple hole drawing of extruded welding rod, nickel ply wire, and plating quality wire with a smooth finish.
STEELSKIN 2217-G (series)	650 lbs. net steel drums	Water-emulsifiable dip compound containing Molysulfide in suspension. For drawing titanium and zirconium tubing.
STEELSKIN WG (series)	260 lbs. net fibre drums	Water-dispersable compound containing Molysulfide. For coating stainless steel, titanium and zirconium before drawing.

These are just a few of the many STEELSKIN products designed for specific wire drawing jobs. Other Steelskin lubricants employ finely dispersed Molysulfide in both oil and water type vehicles. They homogeneously disperse the Molysulfide contained in the finished product to give uniform pick-up, resulting in superior drawing properties.

We welcome the opportunity to recommend specific STEELSKIN products to fit your requirements. **Write today for a free data file on R. H. Miller metal working lubricants.**

Steelskin
REG. U.S. TRADE MARK

METAL WORKING LUBRICANTS

R. H. MILLER

COMPANY, INC., Homer, N. Y.

WIRE
AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 36 JULY, 1961 No. 7

Extruded Cellular Vinyl

by Andrew D. Varenelli
Senior Research Specialist
Naugatuck Chemical Division
United States Rubber Company
Naugatuck, Connecticut

Cellular vinyls have been extruded, probably from the first day that a vinyl compound was processed through an extruder. However, the early production of **this** cellular vinyl was unintentional. The PVC extrudate that was obtained was not called foamed vinyl, expanded vinyl or cellular vinyl, but some choice adjectives were used to describe it. More often than not it was called that "blankety-blank" porous vinyl.

* * *

Cable jackets and insulations that were porous were very undesirable and many feet of cable had to be reprocessed or scrapped. Fortunately, through the use of improved formulations, better compounding techniques, the use of auxiliary equipment at the extruder and by various methods learned throughout the years, ways have been found to eliminate unwanted porosity. Not only have ways been found to eliminate porosity, but means have been found to produce it at will and control it so that the cellular structure can be used to advantage.

* * *

Today in the wire and cable industry cellular plastics are desired for many applications. Cellular polyethylene, because of its very low dielectric constant is used for television lead-in wire, coaxial cables and for other communication cables. (Ref. 1) Cellular vinyl is used to produce cable fillers which are low in gravity, resistant to oil, moisture, chemicals and flame. The low density cellular vinyl fillers easily deform and readily fit into the cable interstices. Also, with the cost of the usual cable fillers going up, and the cost of vinyl going down, the economics of using cellular vinyl for fillers becomes more attractive.

Andrew D. Varenelli

The author presented this paper at the Regional Meeting of the Electric Wire and Cable Section of The Wire Association in New York City on April 28, 1961.

* * *

During the latter part of 1960 the Underwriters Laboratories reported to the wire and cable industry that non-metallic-sheathed cable and underground feeder cables employing a jacket of "expanded" thermoplastic compound (PVC) had been investigated. (Ref. 2) The report stated that "the cable with the jacket in question has been found to comply with all the requirements of the standards for non-metallic sheathed and underground feeder cables".

* * *

This recognition of cellular vinyls by the Underwriters Laboratories has undoubtedly opened the door to the use of cellular vinyls for other wire and cable applications. The product and application engineer needs only to use his imagination to determine where the cellular vinyls could be used to improve and lower the cost of wire and cable.

* * *

Cellular plastics are normally made by incorporating a blowing agent into the base plastic. The blowing agents generally used for

TABLE I

PRINCIPAL COMMERCIAL BLOWING AGENTS AND PROPERTIES

	CHEMICAL DESCRIPTION	TRADE NAME	DECOMPOSITION RANGE IN PLASTICS, °F	DECOMPOSITION TEMPERATURE IN AIR, °F	THEORETICAL GAS YIELD CC (STP)/GRAM	ACTUAL GAS YIELD CC (STP)/GRAM	RAPID EVOLUTION OF THE GASEOUS PHASE	GENERAL PROPERTIES OF THE RESIDUE
1.	Benzenesulfonyl-hydrazide	Porofor BSH Genitron BSH	203-212	217	130	-	N_2	Colorless, odorless
2.	N,N'-Dimethyl-N,N'-dinitrosotere phthalamide	Nitrosan (BL-353)	194-221	221	180	309	N_2	Colorless, odorless
3.	Diazoaminobenzene	Porofor DB	212-266	302	108	132	N_2	Staining, toxic
4.	Azobisisobutyronitrile	Porofor N Genitron AZDN	221-248	248	136	115	N_2	Colorless, toxic
5.	4,4'-Diphenyl disulfonylazide	Nitropore	230-266	288	123	216	N_2	Colorless, odorless
6.	4,4'-oxybis (benzene-sulfonyl hydrazide)	Celogen	248-266	266-302	125	224	N_2	Colorless, odorless
7.	Dinitrosopenta-methylene tetramine	Opex 40 & 41-20 Unicel ND & NDX Vulcacel BN	266-374	383	260	260-275	N_2	Colorless, amine color
8.	Azodicarbonamide	Celogen AZ Kempore	320-392	383-392	193	220-230	N_2,CO	Colorless, odorless non-toxic
9.	Undisclosed	Expandex 177	392-482	464-482	177	176	N_2,CO	Colorless, odorless
10.	Sodium borohydride	-	(1)	932	2370	-	H_2	Colorless, non-toxic
11.	P,P'-oxybis (benzene sulfonyl semicarbazide)	Celogen-RN	380-400	410-419	145		H_2,CO_2	Colorless, odorless

(1) with H_2O >60°C; below pH 9.5 >20°C

plastics are organic compounds which decompose at elevated temperatures. The gas released is usually nitrogen. The choice of blowing agent used will depend upon the plastic which is to be blown and the end product desired.

* * *

Vinyl compounds have been successfully blown in the Naugatuck Laboratories using Azodicarbonamide (CELOGEN AZ®) and 4.4'-oxybis (benzenesulfonyl hydrazide (CELOGEN®).

* * *

Some of the principal organic blowing agents available commercially which are used to manufacture cellular plastics are listed with their properties in Table I (Ref. 3).

* * *

Blowing agents when heated alone, generally decompose at temperatures which appear to be somewhat high for the normal requirements of many plastics. In the presence of certain substances, however, the decomposition can be made to occur at considerably lower temperatures. The inclusion of such substances as "promoters" in the formulation offers a practical method of altering the decomposition temperature of blowing agents to meet certain requirements. (Ref. 4) Many substances have been found to be effective in lowering the decomposition temperature of azodicarbonamide. Some of these are listed in Table II. To determine the decomposition tempera-

TABLE II

Substances Which Lower the Decomposition Temperature of Azodicarbonamide

	Decomposition Temperature
Azodicarbonamide	356-410°F
Acetic Acid	284-383
Phosphoric Acid	194-320
Guanidine Carbonate	275-356
Potassium Carbonate Anhydrous	311-410
Borax	356-365
Cadmium 2-ethyl hexoate	239-320
Cadmium dodecyl mercaptide	266-356
Cadmium barium laurate	275-392
Zinc oxide	266-311
Zinc stearate	302-320
Mercuric oxide	230-393
Barium ricinoleate	293-356
Barium stearate	324-410
Calcium carbonate	311-392
Calcium stearate	302-347
Strontium naphthenate	307-356
Strontium zinc laurate	302-356
Magnesium oxide	329-392
Lead sulfate	320-365
Dibasic lead phosphite	293-329
Dibutyl tin maleate	302-365
Suprex clay	284-392
Silene	275-392
HiSil	311-394
Aluminum stearate	320-374
Titanium oxide	320-383

tures, ten gram portions of one percent suspension of azodicarbonamide in dioctylphthalate as the suspending medium were treated with one-half gram of the substances listed. The temperature range over which rapid gas evolution was observed is recorded as the decomposition temperature.

* * *

The incorporation of blowing agents into vinyl compounds can be accomplished in several ways:

1. **Polyvinyl chloride compounds in granular or strip form containing blowing agents can be prepared by adding the blowing agent to the compound on a mill. To prevent premature activation of the blowing agent, the stock temperature should be lower than the activation temperature of the blowing agent. We have used temperatures 30-40°F lower than the activation temperature.**
2. **Blowing agents can be incorporated into dry blends by simply adding them to the dry blend at any time during the blending cycle. However, the temperature of the blend must be low enough to prevent the premature blowing of the blowing agent.**
3. **The simplest means of adding blowing agent to a vinyl compound and perhaps the most economical in respect to inventory control is to tumble the blowing agent with the granules. The blowing agent is held to the granules by static attraction and any simple mixing equipment can be used satisfactorily.**

* * *

The extrusion of cellular vinyl is not a complex process; however, as with any plastic material, conditions must be established for each type of compound and for each piece of extrusion equipment. There are an infinite number of variables that can be encountered in the many vinyl formulations and in the extrusion equipment used. These variables make it impossible to specifically state what the extrusion conditions should be to extrude cellular vinyl. Generally, the extrusion equipment used to extrude solid flexible vinyls onto wire or into tube or shapes can be used to extrude cellular vinyl. Following are some general recommendations:

* * *

The screw design can be that normally used to extrude solid flexible vinyl. Constant pitch, diminishing depth, single flight, low

compression screws have been used successfully with diced stocks. For dry blends screws of a higher compression ratio have been necessary. Although the problem of loose fitting screws has not been encountered, it would appear as though the tolerance between the screw and barrel liner would be more critical for the extrusion of cellular vinyls than for solid vinyls. With a loose screw it might be difficult to maintain the necessary positive pressure on the gas and vinyl mixture. With a loose fitting screw it is conceivable that the gas would not remain dissolved in the plastic mass, but it would have a tendency to escape back through the extruder's throat.

* * *

The screw speed should be such that with the temperature conditions used the compound temperature will be high enough to completely activate the blowing agent. The screw speed should also be regulated to insure proper fluxing and blending.

* * *

The screen pack can be that normally used for solid vinyls. Combinations of 20/40/40, 20/-40/60 and 20/40/100 mesh screen packs have been used successfully. As for plastic extrusions in general, the screen pack can be varied to obtain the necessary extrusion pressures or dwell time.

* * *

Barrel temperatures and head temperatures of the extruder can be those usually required for vinyl compounds.

* * *

The die temperature should be about 60°F. lower than the stock temperature. A cold die cools the extrudate and toughens the skin thereby preventing the tearing of the skin of the extrusion.

* * *

Dies used for the extrusion of cellular vinyl should have a very short land or no land at all. Experience has shown that smoother surfaces were obtained when dies without any land were used. The length of the die land becomes more critical as the hardness or density of the cellular vinyl decreases.

The die and guider pin should be positioned so that the pressure of the extrudate is as uniform as practical — an uneven flow of the compound through the die can cause roughness on one side of the extrudate.

* * *

The compound temperatures required will be dependent upon the formulation of the compound being extruded. The compound temperature should be high enough to activate the blowing agent. If the compound temperature is below the activation temperature of the blowing agent, a cellular structure will not be formed. Also, the stock temperature should be such that the hot melt viscosity of the extrudate is high enough to retain the gas. If the compound temperature is too high, the viscosity of the stock will be too low and the extrudate will not have sufficient hot strength to prevent the escape of gas.

* * *

Cooling equipment can be that which is generally used in the plastics industry for cooling a plastic extrudate. It is advisable to have the distance of the cooling medium from the head adjustable. The cellular product produced expands immediately as it emerges from the die and complete expansion occurs rather quickly; however, the length of extrudate which must be exposed to the air before it is cooled will depend upon its rate of travel.

* * *

To show the effects of extrusion temperatures on the properties of a particular cellular vinyl, extrusion temperatures were varied so that the stock temperature ranged from 360°F. to 395°F.

* * *

A semi-rigid commercial compound of the following composition was prepared by preblending, Banbury mixing, milling and dicing.

* * *

Polyvinyl Chloride Resin	**100 parts**
Plasticizer	**34**
Calcined clay	**5**
Stabilizer	**7**
Lubricant	**0.25**
Azodicarbonamide*	**0.40**

***0.27 parts of azodicarbonamide were tumbled with 100 parts of the granules.**

One quarter inch cellular rods were extruded through a cross head using a 1-1/2" laboratory extruder, 13-1 length/diameter ratio, equipped with a 1.53-1 compression ratio, constant pitch, diminishing depth screw. The screw was cooled with water at 100°F. The screw speed was 70 RPM and the screen pack consisted of one 20 and two 40 mesh screens. The barrel temperatures were varied.

* * *

Table III shows that there was little variation in the properties of the cellular vinyl produced from this particular stock when the compound temperature varied from 360°F. to 395°F.

TABLE III

Variation in Foam Properties with Variations in Stock Temperatures

Stock Temperature °F	360	370	375	385	390	395
Specific Gravity	0.60	0.58	0.57	0.58	0.60	0.61
Tensile Strength, lb/sq.in.	930	870	900	910	960	970
Modulus, 50% lb/sq.in.,	750	700	670	690	710	720
Elongation, %	130	130	140	140	140	135
Water Absorption, 24 hrs., %	1.0	1.0	1.4	1.1	1.0	0.9
% Deformation, 2000 grams. Room Temp.	15.	18.	16.	16.	14.	16.

The cell structures obtained are shown in the microphotographs, Figures 1A, 1B, 1C and 1D.

* * *

To show how the properties of cellular vinyls will vary with the density, a series of tests were run on 1/4" cellular rods made from a commercial semi-rigid vinyl composed of 100 PVC, 34 plasticizer, 5 clay, 7 stabilizer and 0.25 parts of lubricant.

* * *

The physical properties of cellular vinyls will vary with the density as shown in Table IV. The

TABLE IV

Change in Properties of Cellular Vinyls With Change in Density

	0.58	0.60	0.63	0.66	0.70	0.80	1.32 *
Specific Gravity							
Tensile Strength, psi	900	965	1050	1100	1270	1550	2850
% Elongation	140	140	145	140	195	190	225
Modulus 100%, psi	680	730	780	820	1160	1400	2610
Water absorption, 24 hrs. %	1.1	1.0	0.60	0.55	0.45	0.25	0.06
Deformation, %, 2000 g/250°F. (U.C.Test)	69	68	57	53	53	53	24
Abrasion loss thickness inches (ITP Test Method No. 6037) (modified)	0.10	0.08	0.09	0.09	0.08	0.07	0.02

* solid

tensile strength and modulus of the cellular vinyls increase as the density increases. The elongation increases as the density increases, but the rate of change is relatively small. The percent deformation under a 2000 gram load at 250°F. decreases as the density increases. The percent water absorption decreases as the density

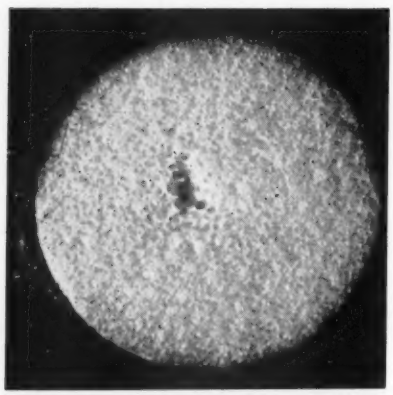


Fig. 1A — Sp. Gr. 0.60 — Stock Temp. 360°F. *

Fig. 1B — Sp. Gr. 0.57 — Stock Temp. 375°F. *

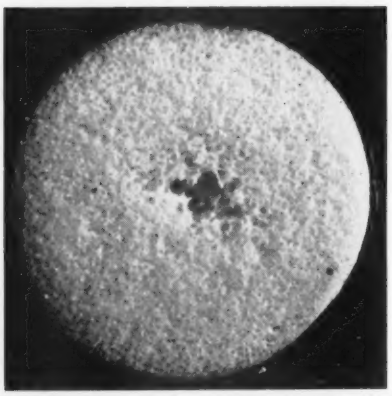


Fig. 1C — Sp. Gr. 0.58 — Stock Temp. 385°F. *

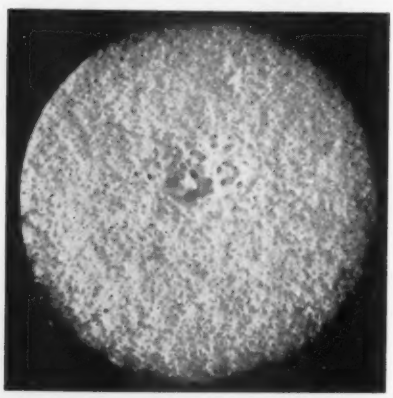


Fig. 1D — Sp. Gr. 0.60 — Stock Temp. 395°F. *

increases, but the percent water absorption is low, indicating a closed cell structure. The abrasion resistance increases as the density increases, but the rate of change is small. Data on the relative abrasion resistance of materials depends to a great extent on the method of testing.

* * *

The relationship between the density and modulus and the density and tensile strength is a straight line as shown in Fig. 2.

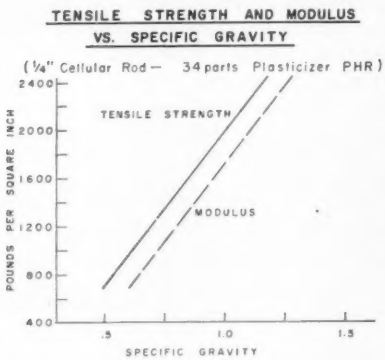


Fig. 2. * * * * * * * * * * * *

The hardness and other physical properties of cellular vinyls, just as for solid vinyls, can be regulated by varying the resin to plasticizer ratio. Extrusion conditions required for the extrusion of cellular vinyls will vary with the type of stock. In Table V are listed the properties of cellular vinyls made from stocks having different plasticizer levels and tabulated in Table VI are the conditions required for extrusion. The extrusions were made on a 1-1/2″ laboratory extruder having a length to diameter ratio of 13:1.

TABLE V

Properties of 1/4" Cellular Rod Made From Stocks with Different Plasticizer Levels

Plasticizer - parts/100 resin	20	30	40	60	100
Azodicarbonamide "	0.4	0.4	0.4	0.4	0.4
Specific Gravity of Base Stock	1.38	1.35	1.31	1.23	1.18
Properties 1/4" Cellular Rod					
Specific Gravity	- - - - - approx. 0.7 - - - - -				
Hardness, Shore A	90	80	75	50	45
Tensile Strength, lb/sq.in.	1560	1150	870	680	530
Elongation, %	50	155	180	275	300
Modulus, 100%	-	910	700	320	250

Formula:

PVC	100
Plasticizer	(as shown)
Stabilizer	7
Clay	5
Lubricant	0.25

The cell structures of the quarter inch cellular rod made from vinyl compounds having different plasticizer levels are shown in the microphotographs, Figs. 3A, 3B, 3C, 3D and 3E.

TABLE VI

Extrusion Conditions Required for Stocks with Different Plasticizer Levels

Plasticizer, parts/100 resin	20	30	40	60	100
Azodicarbonamide, parts/100 resin	0.4	0.4	0.4	0.4	0.4
Compression Ratio of Screw	1.5-1	3-1	3-1	1.5-1	1.5-1
Screw Speed, RPM	50	70	70	70	70
Zone 1 °F	300	290	290	290	290
Zone 2 °F	350	310	310	360	360
Head °F	350	330	330	370	370
Die °F	310	320	300	310	310
Compound Temp. °F	400	380	370	370	370
Pressure in head, psi	3000	2200	2100	800	600

Fig. 3A — 20 parts plasticizer/100 resin. Shore A-90. * * * * * * * * * * * *

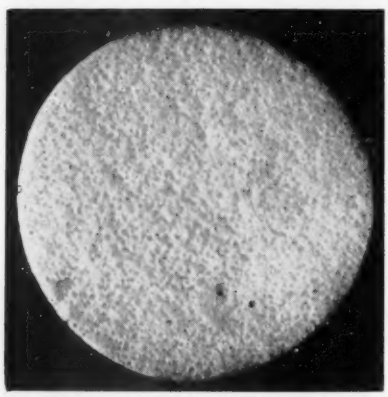


Fig. 3B — 30 parts plasticizer/100 resin. Shore A-80. * * * * * * * * * * * *

Fig. 3C — 40 parts plasticizer/100 resin. Shore A-75. * * * * * * * * * * * *

Cellular vinyl compounds of

(*Please turn to page* 937)

THE BIG PLUS

For Selling The MULTI-MILLION DOLLAR Wire Industry

In this lucrative field of wire and wire products manufacture,

WIRE and WIRE PRODUCTS stands out for its:

Of Vital Interest to Wire Men—Concerning Them and Only Them

EDITORIAL LEADERSHIP

As a one-industry publication, it enjoys extraordinary readership. All articles are slanted at the readers' self-interests.

CIRCULATION COVERAGE

Blankets the Wire Industry with a paid circulation coverage that is complete. No waste circulation — only what you need.

ADVERTISING PUNCH

High reader interest gives advertising an impact not often found in technical magazines. Advertisements are read, because they concern the readers' progress.

WRITE OR PHONE FOR RATES AND DATA

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

WIRE AND WIRE PRODUCTS

453 MAIN STREET PHONE DA 3-0482 STAMFORD, CONNECTICUT

Evolution of Stranding Equipment for Exchange Area Cable at Western Electric Company

by Lester O. Reichelt
Senior Staff Engineer
Western Electric Company
Chicago, Illinois

A paper presented at the Regional Meeting of the Electric Wire & Cable Section of The Wire Association on April 28, 1961, at New York, N. Y.

Exchange Area Cable and the equipment associated with its manufacture is 76 years old. Exchange Area Cable is the cable composed of paired wire circuits extending from the telephone central office to your home and mine and is manufactured of 19, 22, 24 and 26 gage wire in sizes from 6 pairs to 2400 pairs. From a meager beginning in 1884 when the first 51 pair cable was strung across Brooklyn Bridge this business has grown to a current annual demand of over 100 billion lineal feet of wire in cable.

* * *

A cable is assembled from copper wire insulated, in the early years, with textile and later with a helically wrapped paper tape but now with pulp insulation, paper made directly on the wire, or with extruded polyethylene covering. Two insulated wires are twisted together to form a talking pair. The pairs are stranded or "bunched" together to make a cable core. The core is covered with a protective covering which can be lead sheath or a corrugated steel or aluminum sheath with an extruded polyethylene jacket.

* * *

The cable strander has grown with the needs of the business. The evolution of stranding equipment can be roughly divided into three periods, the drum or concentric layer strander period, flier strander with cabler period and the stranding cabler period. Each period is primarily associated with a cable of a particular design and the impetus for developing new equipment has been to meet the needs of these designs. New cable design has supplanted rather than obsoleted previous designs with production emphasis on the newer designs, but old and new designs are still being manufactured side by side on equipment developed to produce these designs.

* * *

The drum strander, better known as the concentric layer strander, consists of a series of reel carriages or drums, upon which the reels containing the pairs are mounted, a paper serving head for applying a protective and confining wrap of paper about the stranded conductors, a capstan for advancing the cable through the machine, and a mechanism for winding and distributing the cable onto a core truck. The number of drums on a strander is governed by the size of cable to be stranded. There is, of course, a space limit to the number of drums which can be placed behind one capstan. This means that due to the characteristics of cable design, cable over 455 pairs has to be made in more than one stranding operation, in which case cotton binding is applied after intermediate operations in place of the paper serving.

* * *

The drums, which vary in size from 10 to 100 reels, are multiples of ten reel holding arbors mounted radially about a central longitudinal passage. The reel arbors are equipped with brakes to control the tension on the wire coming from the supply reels. The drums are mounted in tandem, typical drum capacity arrangements being 10 - 20 - 30 - 40 - 40 - 60 - 60 - 60 - 60 - 80 - 80 for a large strander and 10 - 20 - 30 - 30 - 40 for a small strander. The drums are equipped so that they may be run individually in either direction and at different speeds in relation to the constant speed at which the capstan is advancing the cable to produce the proper stranding lay.

* * *

Figures 1, 2 and 3 show development phases of the drum strander, circa 1890, 1910 to 1915, and 1923, respectively. No revolutionary changes were made in these machines except to improve mechanical design, eliminate wooden frames and overhead belts, improve reel mounting and tension devices, and increase in overall machine capacity.

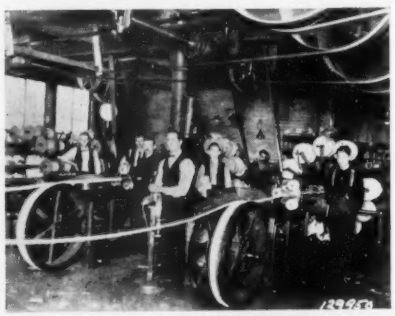


Fig. 1 — Early Stranding Department — 1890.

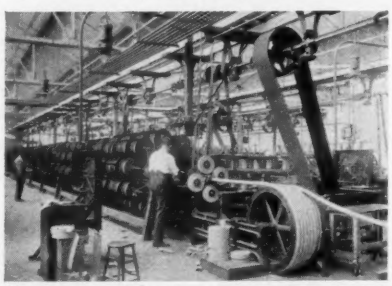


Fig. 2 — Stranding Department — 1910 to 1920.

Fig. 3 — Drum Stranders — 1923. * * * *

The cable take-up reel or core truck is a reel mounted vertically and rotatable on a spindle attached to a truck or dolly having wheels for transporting purposes. Early pictures, 1895 show a truck of this type, and the form has remained practically unchanged except for size, refinements in bearing supports, and adaptation to modern lift truck transportation.

* * *

In 1927 a new type of cable known as Unit Cable was developed coincidental with the development of an 1818 pair 26 ga. cable which was required in the telephone plant to meet expanding telephone business. This cable was contained in the same 2⅝" outside diameter sheath as the then largest 24 gage 1212 pair and thus increased duct capacity 50%. It was not practical to strand this cable in concentric layers because the four operations required resulted in damage to the wire, and existing supply reel tension controls were inadequate for the finer gage wire. Unit cable is shown in comparison to layer cable in Figure 4. Unit Cable is made by first stranding 26, 50, 51 or 101 pair units and then combining the units to make cables in various combinations from 152 to 2424 pairs. Pulp insulated pairs were

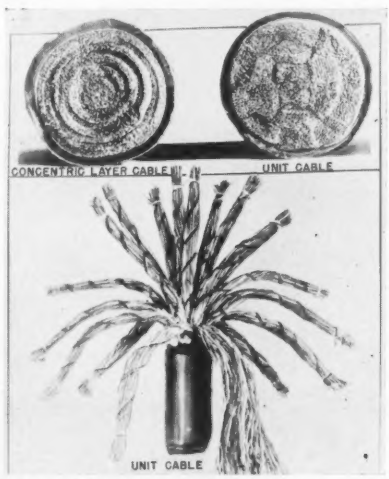


Fig. 4 — Unit Cable and Layer Cable. * * *

also under development in 1927 and could not be concentrically stranded in sizes over 300 pairs because of the inherent characteristics of the pulp insulation.

* * *

Unit Cable required an entirely new concept of cable stranding equipment. Where previously it was necessary to strand 2,000 lineal feet in two operations for a 1,000 feet of the 1212 pair cable, 12,000 feet of unit and 1,000 feet of cable had to be made to obtain the same 1,000 feet of cable. Higher stranding speeds were therefore essential especially for the units to obtain an economical operation.

* * *

The drum strander had speed limitations of 60 FPM on fine wire, and the supply reel tension controls were not suitable. An idea was taken from the rope industry. The drum need not revolve, but the cable could be revolved about a stationary drum within a flier. With a flier revolving at 100 RPM and getting two twists per revolution, 300 FPM was possible with an 18" lay. Figure 5 shows a form of the first flier strander built in 1929 to make units at 300 FPM Figure 6 shows the schematic of this machine. The 101 reel drum is back geared to be held stationary.

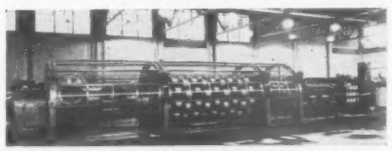


Fig. 5 — Flier Strander — 1929. * * * *

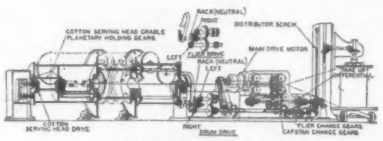


Fig. 6 — Flier Strander — Functional Schematic — 1929. * * * * * * * * * * * *

The 101 pairs are pulled from the supplies in the drum to the rear, through an assembly face plate which positions each pair in the unit, through a serving head that applies a thread binding about the unit to confine the pairs and retain the unit form, through a forming die, around the large pulley, forward through a flier tube over the two directing pulleys and out the front of the machine to the tractor capstan pulling unit and thence to the take-up truck. The front and rear sections supporting the flier tube rotate about the stationary drum. Because of the high stranding speed, the mass of the rotating parts (10 tons), and the stress limitation of the fine wire pairs being pulled from 100 lb. full reels, better reel tensioning devices, machine uniform acceleration and deceleration characteristics and a new binding head for a 10" diameter package to operate at 2500 RPM were developed. A DC motor drive controlled by separate generator excitation was used. The capstan and flier are positively driven and a slipping clutch controlled by a roller riding on the cable drives the take-up truck and distributor. The supply reel tension device has a disc brake contained in one of the cone type reel supporting centers driven by the reel and the retarding force is controlled through a compensated lever system operated by the wire passing over a pulley on the end of a tension arm.

Fig. 7 — Cabler — 1928. * * * * * *

Figure 7 shows the first cabler built in 1928. You will note that there are supply stands which position the trucks, the core truck bodies rotate on their own bearings, and there is a retarding brake on top of each truck. The units are pulled forward through guides, through a distributor plate, a paper wrapping head, a length counting wheel to a wheel capstan and thence to a take-up reel. Figure 8 shows the later design (1931) which has prevailed to the present day. The take-up reel was replaced

Fig. 8 — Improved Cabler — 1931. * * * *

by a large core truck and a tractor capstan replaced the wheel capstan. Figure 9 is a functional schematic. The take-up cradle and capstan revolve to put the twist in the cable. The take-up truck is driven by the large floating ring gear coupled through epicyclic gearing to an external hydraulic

retarding mechanism.

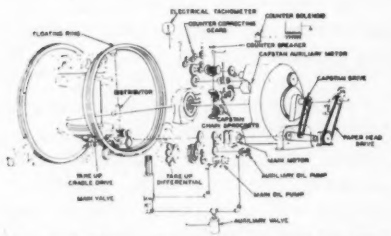


Fig. 9 — Cabler — Functional Schematic — 1931.

By 1934 practically all Exchange Area Cable except 19 ga. had been changed from ribbon paper to pulp insulation and Unit Cable design. Today 19 ga. is also Unit Pulp Cable and the drum strander is no longer a primary factor for Exchange Area Cable manufacture except for cables 101 pair and smaller.

* * *

The tractor capstan on the Flier Strander proved to be a high source of maintenance and caused damage to the pulp insulation on the individual conductors. Means were sought to improve the capstan, but in the end the capstan was eliminated entirely and the pulling transferred to the drum of the take-up core truck. Figure 10 shows the basic steps in this development. Method A shows a mechanical differential with one side gear attached to a 2 foot circumference wheel which rides on and is driven by the cable. The other

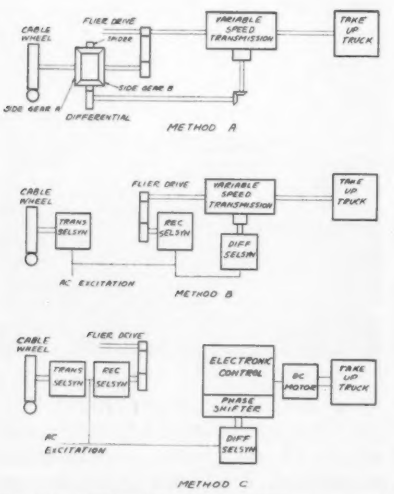


Fig. 10 — Synchronizer Types — 1935. * * *

side gear is driven in the opposite direction from the revolving flier through a ratio that will give one revolution of the differential side gear for one revolution of the cable wheel to maintain the spider stationary when the cable is advancing at the proper speed in relation to the flier speed to maintain the cable lay. The differential spider drives the speed changing operator of a variable speed transmission through which the take-up truck is positively driven in proper relation to the flier speed and lineal cable speed to maintain proper take-up truck RPM's from empty to full truck. When the lineal speed of the cable changes, the spider moves to operate the variable speed transmission to adjust the core truck speed until there is no movement of the differential spider and thus the cable speed is maintained constant at its present value. This differential synchronizer was built into a flier strander in 1935 and operated as expected. The core truck RPM follow of the cable speed was instantaneous even during acceleration and deceleration of the machine. There was however one drawback, the tension on 26 gage units was excessive. A soft DC motor with adjustable armature resistance was added within the rear flier to drive the large pulley. This motor receives its power through slip rings on the flier member from the same generator as the main drive motor and its speed maintains its relation to the main motor within satisfactory limits. This motor is a booster motor. Its speed is adjusted to just under the point where the pulley slips on the cable and under these conditions, this motor takes one-half the load on the cable. Later as in Method B the mechanical differential was replaced by transmitter and receiver Selsyns connected to a differential Selsyn to operate the variable speed transmission. The variable speed transmission, a high maintenance item, was later eliminated and in 1938 Method C a Thyratron Tube controlled DC motor probably the first commercial drive of this type in the 5 HP range to drive the take-up truck was developed. The differential Selsyn rotates a phase shifter in the grid circuits of a 3 phase Thyratron Tube control to vary the armature voltage and speed of the take-up motor.

* * *

With the capstan eliminated, the idea was conceived of putting the take-up truck within the flier and because of the shorter flier span resulting, revolving the flier at 200 RPM and stranding cable at 600 FPM. This meant developing tension means for the 100 lb. supply reel that would maintain about a pound tension in a pair of 26 ga. wire at 600 FPM, a binding head that would operate up to 5,000 RPM and machine elements of sufficient strength to take the 200 RPM flier speed.

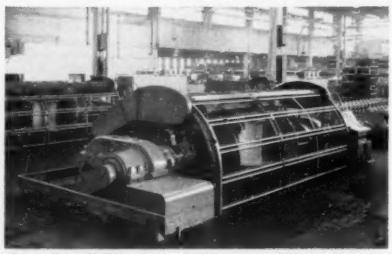


Fig. 11 — Table Top Flier Strander — 1938. *

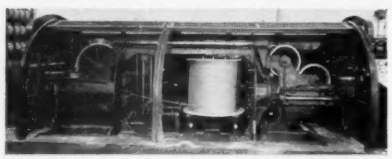


Fig. 12 — Table Top Flier Strander — 1938. *

Figures 11 and 12 show this machine. This is known as the Table Top Flier Strander as the supply reels are mounted on flat table top type frame. The reels are rolled in from and out to the rear for loading and unloading, and the reels are picked up from the loading track by cam operated cone centers. Each reel is individually motor driven. There is a disc brake in the end bell of each reel motor operated through a compensated lever system by a spring held tension arm which is moved by the wire passing over a pulley mounted on the arm end. The brake has enough torque to maintain the motor stalled when the tension arm is in a position, where the brake is fully engaged. As the wire in paying off the reel moves the arm to release the brake, the motor drives the reel and the arm stays at the proper balance point between brake and drive to maintain a preset tension. The pairs are assembled through a face plate, pass through a serving head, over a synchronizer wheel, the guide

pulleys in the revolving front flier unit, through the revolving flier tube, over the large pulley in the revolving rear flier unit to the core truck within the stationary cradle. The booster motor drive to the large pulley is brought in through the center of the rear flier member. The take-up motor gets its power through slip rings in the front flier member. The take-up cradle is back geared through the front flier unit.

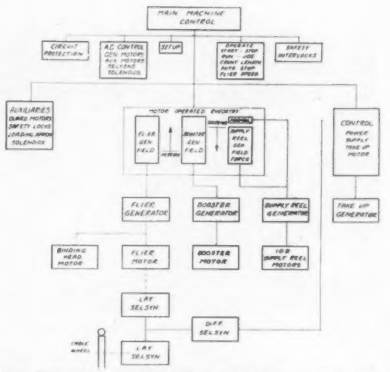


Fig. 13 — Table Top Flier Strander — Functional Diagram — 1938. * * * * * * *

Figure 13 shows the functional diagram. There are four main DC shunt motors plus 102 supply reel motors. The main drive motor and the serving head motor are supplied by one generator, the booster motor by a separate generator and 102 supply reel motors by a third generator. The take-up motor is rectified DC controlled by the synchronizer. The supply reel motors which are fractional HP self-excited DC shunt motors with resistance in series are fed from a single generator. Motor operated rheostats control the generator fields to obtain proper acceleration, deceleration and operating speed of the main drive, serving head and booster motor. The supply reel motor voltage is raised by generator field control during acceleration to overcome reel inertia and maintain uniform tension during the 40 sec. starting period.

* * *

The 1938 version of the Flier Strander and the 1931 version of the Cabler are proven designs and additional machines have been built for each increase in stranding capacity. However, when the Omaha Plant was built in 1956, a Stranding Cabler was designed which combined the functions of both the previous Flier Strander and Cabler, and Unit Cables can now be made in one operation and the unit stranding operation eliminated. Although this machine can be used for pulp cables, it was designed specifically for plastic insulated cable.

* * *

Three machines comprise the Omaha installation. Cables of 400 pairs can be made in one operation and up to 900 pair cables can be made in multiple operations. Figure 14 shows an overall picture of this installation. Figure 15 is a diagrammatic layout. Each of the three machines consists essentially of a central control station, one or more 108 reel supply units having four coordinated oscillating face plate and unit binding head units, one for each group of 27 reels, a cable core assembly plate, a twist compensator, a synchronizer, a main core binder, a cable snubber, and a revolving take-up unit containing the take-up reel. The take-up revolves to put the twist in the cable, and the take-up truck does the pulling at constant lineal speed as controlled by the synchronizer. Machine No. 1 has three permanently attached supply units, Machine No. 2 two units and Machine No. 3 one unit. Machine No. 1 also has 18 cabler supply stands so No. 1 machine may also be used as a standard cabler. Supply Unit No. 4 can be used with either Machine Nos. 1 or 2 and Supply Unit No. 7 can be used with either Machine Nos. 2 or 3. This gives Machine Nos. 1 and 2 a capacity of 400 pair cable and Machine No. 1 a capacity of 200 pair cable.

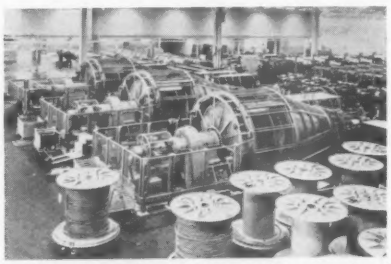


Fig. 14 — Stranding Cabler — 1958. * * *

* * *

Starting at the end there is the the revolving take-up unit. This consists of a cradle member suspended between bearings containing the core truck, the core truck drive and the main motor drive to the revolving cradle. The revolving cradle which is driven by a DC motor at constant speed does the twisting and is the reference for all other machine units which are synchronized to maintain speed relations in relation to the revolving take-up and the lineal speed of the cable. The take-up truck motor mounted on the center of the

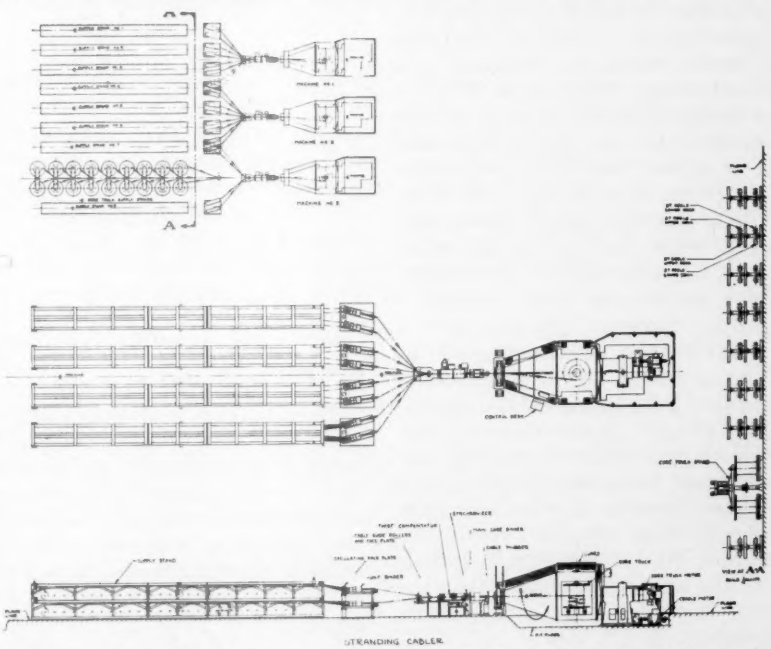


Fig. 15 — Stranding Cabler Layout. * * * * * * * * * * * * * * * * *

cradle axis has its power supplied by slip rings and through a series of belts and gears drives the take-up core truck and also the cable distributor in direct relation to the speed of the core truck. In between the distributor and the take-up truck there is a selective gear box which allows for speed change of distribution required for each particular cable size.

* * *

Proceeding to the left the next unit is the cable snubber which is a power operated clamp to hold the cable taut back to the supplies while the core truck is being changed.

* * *

Next is the main core binder to apply a binding to hold the units in place to retain the final cable form.

* * *

The next unit is the synchronizer consisting of two two foot circumference wheels, one supporting the cable, one riding on the cable and both driven by the cable. The lower wheel drives a tachometer and a Selsyn which integrate into a network to coordinate the take-up truck speed to maintain the correct lineal cable speed. Thus as the cable climbs one layer on the take-up truck and the cable speeds up, a signal to change automatically slows down the take-up truck to maintain the cable speed. The upper wheel riding on the cable drives a photo electric transducer which counts the cable footage.

* * *

Next is the twist compensator which consists of a plurality of free running holding rollers mounted in a cage that revolves in synchronization with the main cradle. This unit sets the twist in the cable so there is no rotation of the cable between the twist compensator and the take-up truck. In this way the amount of material in the cable is properly adjusted to the cable lay.

* * *

Next is the assembly face plate and rollers which guide the various cable units into the proper position for assembly into the final cable. Further back along the units are the individual serving heads for each unit which place the individual binding on the units and guide them on proper course to advance to the main assembly face plate. In conjunction with the serving head is the oscillating face plate for assembling the individual pairs in their proper positions in the unit. These plates are set to revolve 180° and then reverse 180° at very slow speed at one complete oscillation per 125 feet of cable. * * *

At the left end are the supply reel units consisting of four 27 pair reel groups on two levels. The supply reel tension control is a motor driven reel with the retarding brake the same as used on the Table Top Flier Strander. To the rear of each supply reel row is a conveyor on which the reels are placed on individual dollies in proper loading sequence. The reel group is directed to a conveyor in the supply where the row of dollies is picked up by a conveyor belt and advanced until each reel is in place when air operated clamps lift all the reels simultaneously off the dollies into running position. Each 27 reel row has mounted at its forward end an oscillating face plate and a unit binding head. The wire is threaded over the tension arms along the top of the reel group forward to the face plate and serving head unit. When the wire has been run off the reels, the wire is cut and all reels are dropped back on the dollies which have remained in place on the belt while the cable was being run; the conveyor belt reversed and the empty reels shunted to the empty reel conveyor. * * *

The machine is controlled from a central desk. The take-up cable lengths are controlled by an automatic stop counter. Automatic control positions and locks the cradle for unloading and reloading the take-up core truck. Figures 16 to 20 show the various units of this machine. * * *

Figure 21 shows the functional diagram of the machine. All machine units are individually driven by DC motors. The main cradle motor is controlling and runs at a preset speed. It drives the Cradle Tachometer to maintain its own speed regulation through electronic control and also a Lay Tachometer and Lay Selsyn, Twist Compensator, Main Binder, and Unit Binder Tachometers in proper ratio to follow the cable lay. Difference signals are developed between these tachometers and tachomotors driven by the individual machine

(*Please turn to page* 924)

Fig. 16 — Stranding Cabler — Storage Conveyor.

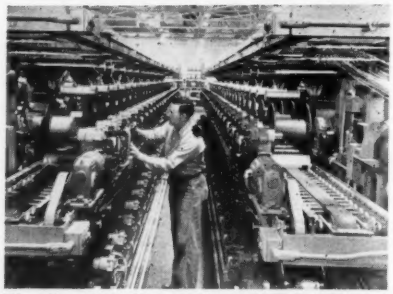


Fig. 17 — Stranding Cabler — Supply Unit.

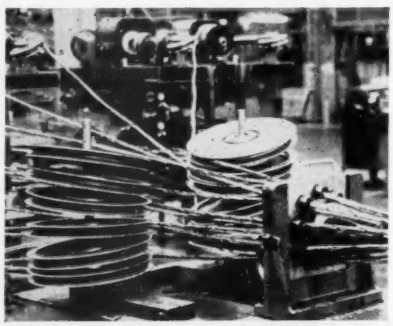


Fig. 18 — Stranding Cabler — Unit Binder.

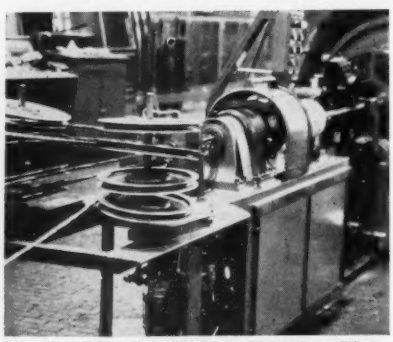


Fig. 19 — Stranding Cabler — Main Core Binder

Application of Paper Fillers in Electrical Cables

by R. L. D. Aigler
Sales Manager
Plymkraft Division
Plymouth Cordage Company
Plymouth, Massachusetts

This paper was presented by the author at the Regional Meeting of the Electric Wire and Cable Section of The Wire Association on April 28, 1961, in New York City.

During the past fifteen years the electrical wire and cable industry has been subjected to the same rising costs of manufacture common to all other industries. In recent years, however, these costs have become increasingly difficult to pass on to the customer via higher selling prices, thereby making it necessary to substitute lower cost materials as well as increase manufacturing efficiency wherever possible. This presentation deals with one facet of lower cost material — the substitution of twisted paper in place of jute as a cable filler. With the rising cost of jute it has been necessary to look to other materials that would perform the same function, better, at lower cost, and, at the same time, be available in quantity from reliable sources of supply. Many manufacturers have already found paper to meet these requirements in every respect for paper is substantially lower in cost, made from domestically produced raw material and available from a number of reputable converting mills.

* * *

There are basically two functions a cable filler can perform, first that of strictly filling a void area in the cable and, second, filling the void plus adding tensile strength to the cable. We will cover first the application of filler used only to round up the cabled conductors prior to jacketing. Twisted paper filler of this type is available dry-untreated, hot or cold wax impregnated in various amounts, saturated with coal tar derivatives, anti fungus or other special treatments to fill your specifications.

* * *

In this paper we will discuss hot waxed kraft paper twisted into a single ply yarn which we call lightly waxed cable filler. This filler is normally made from a 30 to 40 pound basis weight northern twisting kraft, of the following specifications:

A. The paper is made by the sulfate process from virgin pulp.

B. No reclaimed paper of any kind is used in its manufacture.

C. The paper is unbleached.

D. The paper is free from metallic particles and pin holes.

E. The paper is free from slime spots as good commercial practice will allow.

F. Ash content is from 0.5 to 0.6% when determined by the method described in A.S.T.M. Designation D-586-42.

G. Water extract conductivity of the paper is 15 to 20 microhms per centimeter when measured, by the method described in A.S.T.M. designation D-202-52T.

H. Alcohol-Benzene extract is 0.4 to 0.5% when measured by the procedure described in A.S.T.M. designation D-202-52T, Section 86 to 92.

I. PH reading is 6.5 to 7.0.

J. The small amount of sizing is a rosin size made with Delthirna-method, is fully saponified and contains no free rosin. The amount of sizing is typified by the Alcohol-Benzene extract figures stated before.

K. Total sulphur content is .07%.

Prior to twisting a paraffin base wax is applied to the paper at elevated temperature so as to completely impregnate the paper. For most purposes a 15-20% wax application is sufficient to give the desired moisture resistance and is comparable in this quality to waterproofed jute. Successful use of lightly waxed paper filler has been found in non-metallic sheathed cable, underground service entrance, lead sheathed (shipboard), varnished cambric, interlocked armoured and control cables.

* * *

In comparing the filling capacity of lightly waxed paper filler with jute the table listed below will be helpful as it shows paper — jute equivalents so far as size or fill capacity is concerned. You may also note the yardage or weight (Ft./Lb.) of the two materials is very close, but in most sizes lightly waxed paper filler has a yardage advantage. (See table below)

* * *

Due to paper's greater resiliency it is possible to pack it in the cable more tightly than jute and at the same time add less weight to fill any given area. The following example may well serve to illustrate the economy of paper over jute and for this example we shall

APPROX. PAPER EQUIVALENT OF JUTE YARN

Twisted Paper (Lightly Waxed)				Jute	
Size		Ft./Lb.	Circular Mils/End	Size	Ft./Lb.
.050 " Dia.	3/64"	1,750	2,500	No. 25	1,642
.0625" "	1/16"	1,100	3,800	40	1,026
.071 " "	5/64"	565	7,200	75	549
.0983" "	3/32"	490	8,600	85	483
.1094" "	7/64"	400	10,900	100	411
.112 " "		315	13,600	135	305
.125 " "	1/8"	260	15,850	160	255
.1406" "	9/64"	235	19,000	200	205
.175 " "	11/64"	125	28,250	345	122
.2187" "	7/32"	100	39,500	400	103

use a 3-conductor underground service entrance cable, each insulated conductor measuring .4174" outside diameter.

* * *

The area of the core is 9,000 circular mils which indicates the use of a 3/32" diameter filler. The area of each interstice is 94,000 circular mils. By reference of above chart 5 ends of 9/64" or 13 ends of 5/64" could be used to fill this area. We shall use the 5/64" filler, hence a total of 39 ends would be required to fill all three interstices. The yardage of this particular size is 565'/lb., so 565 ÷ 39 indicates 14.5 feet of cable can be filled with one pound of this filler or 1,000 feet of cable would require 69 lbs. converted to dollars, with lightly waxed paper cable filler in this particular size selling for 20½¢/lb., the figure for filling the three interstices would be $14.14.

* * *

When the cost of the core is added to this, the total cost of fillers for this 1,000 ft. length is $14.54. These costs are based on a straight length basis with no allowance made for twist in cabling which would normally run approximately 2-3%.

* * *

By comparison, the cost of doing this same job with moisture resistant treated jute would be substantially more. To correspond with the 5/64" paper, 39 ends of 75 lb. jute yarn would be used to fill the interstices and a 85-lb. jute yarn for the core. The total weight of jute involved in this case is 73 lbs. Converted to dollars with a current jute price of 32¢/lb., the cost would be $23.36 or 60% more than the cost of using lightly waxed paper filler. This saving is not unusual and is being realized in like proportions on any number of sizes and types of cables.

* * *

So far we have dealt only with the **economy** of using paper fillers, however, there are other factors to be considered that make paper a very desirable filler from the standpoint of quality. Because it can be slit accurately paper has more uniformity than other natural fiber fillers. Yarn size, weight, treatment application and length of yarn on tube can be held to much closer tolerances. This holds true not just between individual samples of a given shipment but from order to order over any length of time. Because of this consistency some plants have been able to greatly reduce or even eliminate quality control checks that are necessary on other types of filler that cannot be manufactured with such close tolerances. Another very distinct advantage of paper is the difficulty encountered in tying a knot on tube run-out or yarn breaks. Because a knot so obviously enlarges paper filler at that point, machine operators at our plant and your plant will not attempt to knot paper, as it is very easy to splice perfectly or butt with tape with no enlargement of the filler at the jointure. This is contrary to the practice employed with jute where a good splice is difficult and all too often a knot is used only to cause trouble later in the jacketing operation. Last, but not least, in quality comparison of lightly waxed paper filler is the cleanliness of the product itself. It is clean running with no possibility of fuzz build-up to later drop into the cable. Its lack of fuzzy surface allows a cable to be easily and cleanly stripped without the presence of fibrous fuzz to contaminate a spliced joint, a fact which in itself has caused considerable interest.

* * *

The next section of this paper encompasses the application of paper fillers with strength members, used where fill capacity plus tensile strength is required, which is primarily in the Flexible Cord field. Fillers used in this type cord must round up the innards, add sufficient tensile strength to meet U.L. strength tests and be flexible enough so as not to impart stiffness to the finished cord. Until recent years cotton and jute were the standard for the industry for they accomplished the aforementioned functions. In the past five years there has been acceptance by many mills of a new concept for this type filler which employs the use of a twisted, soft, light weight tissue with a strength member in the center. Instead of using a number of ends of small yarn to build up the desired filling capacity, a single end of filler is used in each interstice. To date, the only strength members commercially in use in combination with paper are sisal and glass. My company has been and still is evaluating other fibers to perform this strength function, but so far these two have proven to be the only acceptable ones that are economically sound.

* * *

This type filler which we call S.J. (Sisal) Cable Filler has experienced ready acceptance by many mills throughout the U.S. and Canada, because it is more economical to buy and use. Basically the price per pound is somewhat less than jute but equally as important is the fact that fewer pounds are used to do an equal filling job consistent with the tensile strength required. For example let us take a typical 16/2 S.J. Cord. Most mills have used 10 ends of #14 count jute per interstice or 20 ends to fill this cord. This particular size jute, single end runs 2,932 ft./lb. so 20 ends would yield only 146 ft./lb. or it would require 6.8 lbs. of jute to fill 1,000 feet of this cord (discounting the twist loss due to cabling). At today's market of 32¢/lb. the cost of jute filler for this cord is $2.17.

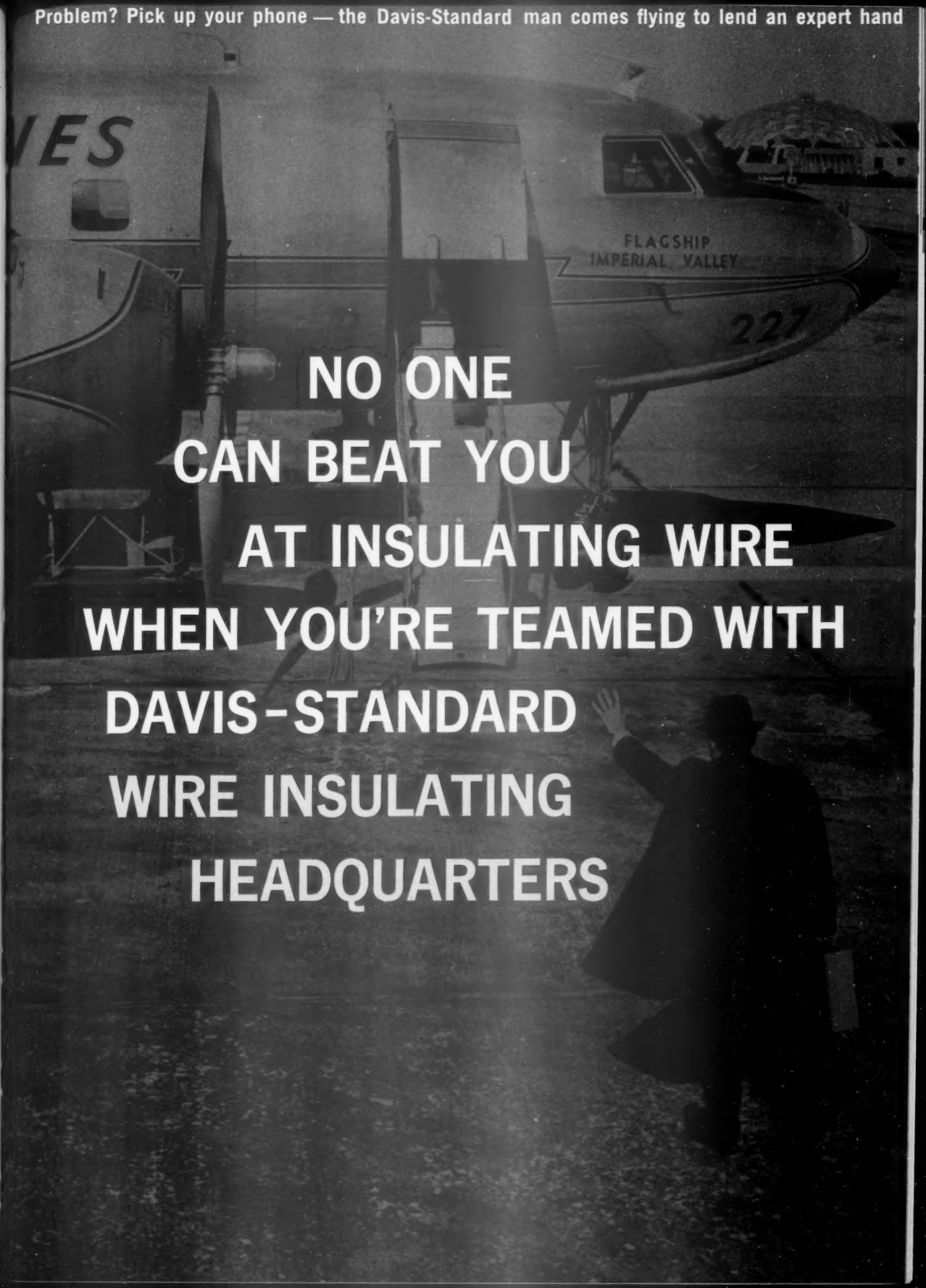
* * *

On the other hand a single end of 3/32" diameter S.J. (Sisal) filler per interstice will do the same job. This size filler runs 465 ft./lb. and since 2 ends will be required the yardage will be cut in half to 232 ft./lb. or 4.3 lbs. of filler for 1,000 feet of cord. With a current price of 28½¢/lb. for this material the cost of filling this same cord is $1.23 or roughly half the cost of using jute and even less than half if cotton were used. I would be less than truthful, however, if I did not point out that not all savings are this dramatic and generally speaking the larger the cord the greater the economy of this type filler, nevertheless, savings are available with this type filler in every size flexible cord.

* * *

As stated previously the economy of this filler is not confined to its lower price per pound and lighter weight but extends to the

(*Please turn to page* 925)


Problem? Pick up your phone — the Davis-Standard man comes flying to lend an expert hand
FLAGSHIP
IMPERIAL VALLEY
227
NO ONE
CAN BEAT YOU
AT INSULATING WIRE
WHEN YOU'RE TEAMED WITH
DAVIS-STANDARD
WIRE INSULATING
HEADQUARTERS

COST IS NO OBJECT TO DAVIS-STANDARD WHEN IT COMES TO SERVICE

From design through test runs — from start-up to continuous operation — your Davis-Standard man is on the spot to see that **no one can beat you at insulating wire.**

Even **more** than an engineer, he's a practical businessman who can advise you on all phases of wire and cable insulating and jacketing equipment.

He **should** be able to — he's backed by the industry's Number One designer-builder of wire line equipment — the **one and only builder** of complete systems.

FIRE A QUESTION AT HIM!

Should you install a horizontal or a vertical continuous vulcanizing system? Is a high speed dual take-up practical for the wire you run? Could you speed up your line by other means? **Should** you — or would other factors such as lower quality outweigh the advantages of higher productivity? By installing specialized components, how much are you limiting versatility? What can you gain by installing a matched component wire line system?

Tough questions? Yes, but not too tough for your Davis-Standard man. He has — or mighty soon can get — most of the answers. And they'll be straight — **uncompromising.** After all, his advice is unbiased because he represents the company that produces every type of wire insulating equipment.

SATISFACTION GUARANTEED

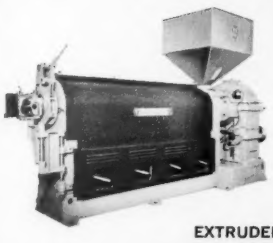
When you need service — no matter what the problem — time and money are no object to the Davis-Standard man. Nor to the company that backs him up. Teamed with Davis-Standard, you get all the assistance necessary to help you keep producing more and better wire at lower cost.

BETTER YOUR COMPETITIVE POSITION

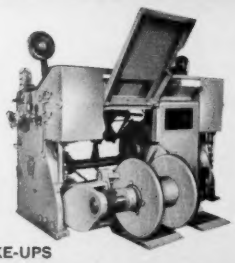
You **can** — if you have Davis-Standard on your team. Of course we welcome customer cooperation — **two** heads are surely better than one.

Which is why no one can beat you at insulating wire when you're teamed with Davis-Standard — wire insulating headquarters.

The only complete line of wire insulating equipment—good reason why your Davis-Standard man's recommendations are unbiased.

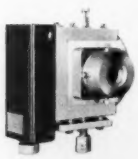


EXTRUDERS

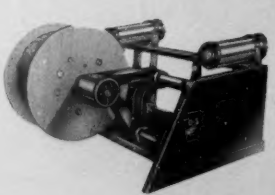


TAKE-UPS

CAPSTANS

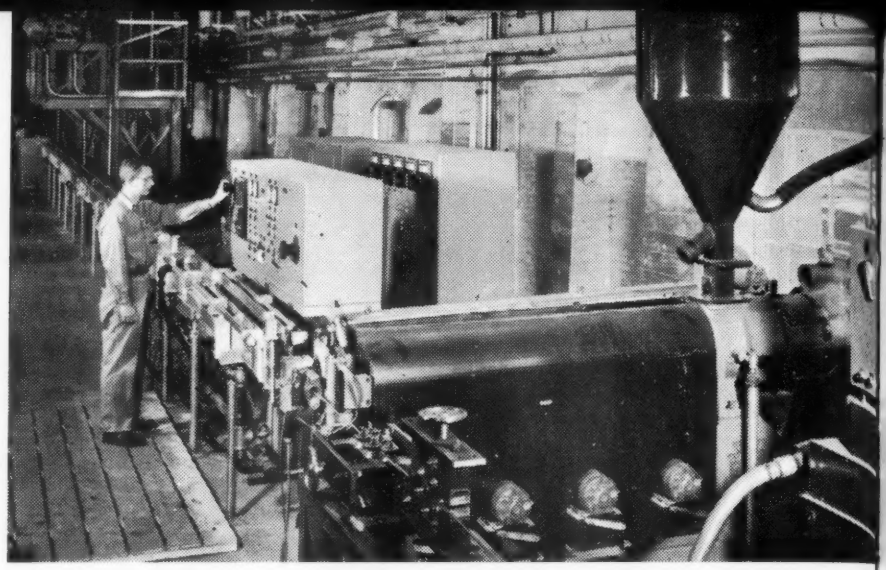


CROSSHEADS



PAY-OFFS

NO ONE CAN BEAT YOU AT INSULATING WIRE WHEN YOU'RE RUNNING A



DAVIS-STANDARD MATCHED COMPONENT WIRE LINE SYSTEM

A wire line system is only as good as its weakest or least productive component. That's why your Davis-Standard man can prove to you you'll better your competitive position when you install a Matched Component wire line system.

Expensive? Not when you consider how each and every one of these benefits eliminates one problem or another, to add up to a sum total of faster, lower-cost production of better wire and cable.

— **Eliminate idle capacity.** Each component is designed into a coordinated system. There are no "weak sisters" to hold back the team from working together at peak capacity.

— **Eliminate costly engineering.** It is competitively unsound to utilize your expensive engineering time adapting unmatched units into a system. Davis-Standard experience eliminates these costs with pre-engineered matched components — eliminates future and unavoidable headaches resulting from poorly-coordinated components, too.

Challenge your Davis-Standard man to **prove** you'll make money with a Matched Component wire line system.

D-S thermatic

DAVIS-STANDARD

Division of
FRANKLIN RESEARCH AND DEVELOPMENT CORPORATION

14 WATER STREET, MYSTIC, CONNECTICUT

Silicone Rubber Insulated Wire

by Joseph D. Harrington
Product Planning Engineer
Silicone Products Department
General Electric Company
Waterford, New York

In selecting an insulating material for a wire and cable application, the engineer is, more often than not, faced with a compromise. The ideal insulation would be low in cost, readily available from several sources, easily processed in long continuous lengths on conventional equipment, readily identified in a cable by color coding or surface printing, and suitable for further processing such as the application of braids, lacquers, and jackets without damage.

* * *

In addition to the foregoing characteristics which are of great interest to the fabricator, the user may, and often will, specify the following properties in the completed wire or cable:

High Electric Strength — and good fatigue life under continuous electrical stress. Retention of high electric strength over the full range of operating temperatures.

Good Insulation Resistance — not only at room temperature but at operating temperatures of the equipment in which it is installed.

Low Dielectric Constant — at both low frequencies and at high frequencies.

Low Power Factor — over a range of frequency and temperature.

Resistance to High Temperatures.

Low Temperature Flexibility.

Resistance to Moisture and Chemicals.

Good Physical Properties — such as high tensile strength, elongation, tear, compression set, and abrasion resistance.

High Thermal Conductiviity — to rapidly dissipate heat generated by heavy current loads.

Good Radiation Resistance — for service in proximity to nuclear reactors and in the radiation belt of outer space.

Fire Resistance — to permit continued operation of circuits under disaster conditions.

Corona Resistance — for high voltage applications and when cable is installed in proximity to high voltage equipment.

Ozone and Weather Resistance.

Fungus Resistance — for equipment which must be stored and operated in humid and tropical areas.

Retention of the Above Properties — over long periods of time under adverse conditions of operation and storage.

* * *

There is no insulating material that meets all of the above criteria and it is, therefore, the task of the cable engineer to select that material possessing a combination of characteristics and properties best suited to the intended application.

* * *

Joseph D. Harrington

Joseph D. Harrington, Sales Development Specialist on Wire and Cable Products, has been associated with the wire and cable industry since 1939. He has been a product engineer in the G. E. Wire and Cable Department since 1957 and, prior to this time, he was with the Office of Naval Material and the Navy Bureau of Ships. In the latter position, he worked with G. M. VanLear on the development of silicone rubber shipboard cable. He was responsible for development of specification MIL-W-16878 for high-temperature hook-up wire and represented the Navy Department on the Department of Defense committee for standardization of wire and cable.

This paper was presented at the Regional Meeting of the Electric Wire and Cable Section of The Wire Association on April 28, 1961, in New York City.

It will be the purpose of this paper to review some of the more important applications for silicone rubber insulation during the past decade and to discuss the properties of silicone rubber which led to its selection in these applications.

* * *

It is sometimes difficult to realize that silicones did not move from the laboratory into industry until the early 1940's and that during World War II, the principal electrical application for silicone was as a dielectric grease to protect ignition systems from moisture. The first practical silicone elastomers were developed in 1943 and these early silicone rubbers were used in such applications as searchlight gaskets and as gaskets for turbo superchargers. Wire and cable usage began at a rate of a few thousand pounds yearly during the late 1940's. Although these early compounds were useable within a temperature range of -50 F to +500 F and were good electrically, their physical properties left much to be desired. Tensile strength in the order of 300 pounds per square inch, elongations ranging between 75% and 125%, and tear strength as low as 20 pounds per inch were the order of the day. These values present a sharp contrast with present-day tensile strengths of 1500 pounds per square inch, elongations of 600%, and tear strength up to 200 pounds per inch.

* * *

In 1949, great impetus was given to the use of silicone rubber in wire and cable by the redesign of Navy shipboard cable to require the use of silicone rubber insulation in control cable and in small power cable. Specifications

15-C-14, issued in 1949, required extruded insulation with a minimum tensile strength of 400 pounds per square inch and a minimum elongation of 75 percent. The history of development in Navy shipboard cable specifications which led to the adoption of silicone rubber as an insulating material is of sufficient interest to digress briefly since, in many ways, it parallels or leads commercial developments.

* * *

Electricity was already in wide use on the vessels in the 1890's — it served for lighting, including searchlights; to power electric motors for driving ventilators; and for communication purposes. Rubber insulated conductors were used for all circuits. The insulation consisted of a 1/64th inch layer of pure unvulcanized rubber next to a tin coated copper conductor and covered by a substantial layer of vulcanized rubber compound. By 1900 the Navy had started to specify that this vulcanized rubber be a 40% compound. Protective coverings over the rubber insulation consisted of a layer of rubber compound-filled cottoncloth tape with an over-all cotton or linen braid. This braid was saturated and filled with moisture resistant asphalt compounds.

* * *

Cable were originally installed in wooden molding which, by 1907, had been largely superseded, except for maintenance and repair, by rigid, enamelled steel conduit or brass conduit. The use of brass was limited mostly to runs exposed to the weather or to salt water and to locations where sharp bends had to be made.

* * *

The advent of armored type of cable in 1912 resulted in a major change in Navy cable practice, especially from an installation standpoint. Armoring consisted of an over-all covering of galvanized steel wire applied as a basket weave braid. The use of conduit was no longer necessary. The pure, unvulcanized rubber layer insulation next to the conductor was also omitted and the 40% rubber compound composed the entire insulation thickness.

* * *

Varnished cambric insulation came into use in Navy cables in the period following World War I. It was first used for the larger sizes of power and lighting cables and later on for smaller conductors, including interior communication cable. The varnished cambric insulation provided better heat resistance than rubber insulation and, in the case of heavier power cables and feeders for lighting circuits, permitted the use of smaller size conductors for a given current loading. The permissible conductor operating temperature was now raised from 60C to 75C.

* * *

In the year 1930 "flame-proof" cables, "Type FP Series" were introduced, employing composite asbestos-varnished cambric insulation, which was capable of operating up to 90C conductor temperature. In 1936 the heat and flame resistant cable (HF Series) was developed. These types employed asbestos and varnished cambric insulation, an impervious sheath covered by a metal basket weave armor, a lead sheath or a fabric braid, and had a permissible maximum conductor operating temperature of 105C.

* * *

During World War II the development work in shipboard cable carried on by the Navy Department and by the wire and cable industry in cooperation with the Navy Department was aimed at the development of watertight cables although it was recognized that the increased complexity and growth in the shipboard electrical plant and distribution system had made it necessary that the size and weight of cables and wireways be reduced. In 1942 a program was initiated to determine the extent to which insulation thicknesses and the thickness of other components might be reduced without a sacrifice in performance. In 1943 another program was initiated to conduct a thorough study of all available insulation materials. The silicones were coming into prominence shortly after World War II and appeared of such promise that the Navy conducted a thorough study of their properties. It was soon recognized that it would be possible to reduce insulation wall thickness and it was determined by test that silicone insulated cables, employing a glass braid over the silicone insulated conductors, would continue to operate and maintain electrical integrity even during intense fire. Another benefit obtained by the use of silicone was the retention of good insulation resistance values even at high operating temperatures. In the redesign of the small power and control cables, the thermoplastic insulation and felted asbestos walls were replaced by silicone rubber insulation. In large power cable, the asbestos-varnish cambric wall of insulation was replaced by a silicone resin-treated glass tape. At a later date, the silicone resin-treated glass tapes were replaced by silicone rubber-treated glass tapes in order to obtain improvement in the flexibility of the cables. In summation, there were four principal reasons for the adoption of silicones in Navy shipboard cable:

1. **They maintained high insulation resistance at high temperatures.**
2. **They permitted a reduction of 30% in space requirement and effected a 20% reduction in weight. For instance a 30-conductor cable of the new design could be installed in the same space as a 10-conductor cable of the superseded construction.**
3. **When burned, they formed a non-conducting ash which permitted continued operation of the cable even during a fire.**
4. **Their aging characteristics were excellent, even when operated at high ambient temperatures, and they could thus be relied upon to outlast the vessel in which they were installed.**

* * *

During the early 1950's silicone rubber was also becoming established in other military applications. Its ability to operate in temperature extremes, its excellent resistance to dielectric fatigue, its corona, ozone and moisture resistance resulted in improved reliability for ignition wiring in tanks, vehicles and military aircraft and for use as aircraft wire in general wiring of the airframe. Specification MIL-

C-3162 was issued to cover ignition wire applications. Specification MIL-W-8777 was issued to cover aircraft wire applications. In addition to these military specifications, numerous specifications were issued by aircraft manufacturers to fill their own particular needs.

* * *

Commercial applications were also on the increase. Silicone rubber insulated cables were sold in quantity to metal foundries, cement plants and glass factories. Electric utilities found it necessary to improve their distribution system to handle their increased generating capacity and the increased load on their system. The increased system load, coupled with high ambient temperatures during the summer months, was beginning to result in failures which, though isolated, were indicative of things to come. In the construction of new generating stations, provision could be made for installation of cable sufficiently large to carry expected current load with only moderate temperature rise. However, in the older generating plants where capacity had been increased, a problem existed. During the summer of 1948 a series of failures occurred in 15 KV varnished cambric generator leads at a leading eastern utility station during a period of extreme heat. Again, in 1953, failures were experienced on varnished cambric station cables due to high ambient temperatures and increased dielectric losses. After intensive investigation of the properties of silicone rubber insulated cables, an installation of 15,000 volt silicone insulated cable, operating at 13,000 volts was made in 1954. These cables replaced overloaded varnished cambric cables which had deteriorated under installation conditions. In this instance, the alternative was expensive new duct construction for additional cables or enclosed bus. The cable used in this case was a 2,500,000 circular mil conductor insulated with glass tapes to a wall thickness of approximately 250 mils. In another installation, two years later, a 3,500,000 circular mil varnished cambric insulated cable was replaced with a 3,000,000 circular mil silicone rubber insulated, lead covered cable. These cables had 200 mils of insulation as compared with 250 mils of insulation in the previous installation. All data obtained upon this type of cable indicated that it could be operated at a 125C continuous conductor operating temperature and that it possessed excellent electrical stability with low power factor and dielectric constant at rated temperature. These characteristics insured low dielectric loss which had been difficult to obtain with other types of insulation at elevated temperatures. Using silicone rubber insulated cables, the current carrying capacity was increased some 40% over equivalent varnished cambric insulated cables in this installation. The fact that distribution systems are being subjected to increasingly severe service was highlighted less than two years ago when an underground power cable short-circuited in a large eastern city one hot summer day. By 11:00 that morning, three of the twenty feeders serving an area containing some one-half million people were out of operation. By early afternoon, a fourth feeder went out and, a few minutes later, a fifth feeder gave way. When a sixth feeder blew out at 3:00 p.m., the switches were pulled and the area was left without power. By heroic effort, service was restored to normal within twelve hours, but the city had witnessed a vivid demonstration of the combined effects of heavy current loads and high ambient temperatures. It is not intended to suggest that entire distribution systems will be wired with silicone-insulated cables in the foreseeable future, but it is apparent that silicone-insulated cables are needed to withstand rigorous service in particularly troublesome locations.

* * *

As a greater number of motors, transformers and other apparatus has been built using Class H insulation, there has been an increase in use of silicone rubber insulated apparatus lead wire. Leads going into this type of apparatus may be laced or fastened so that they are in direct contact with the hot windings and the iron cores. The leads may be grouped tightly together so that mutual heat is present. This means that the leads may operate at temperatures above that recommended for organic insulation materials. Corona and ozone are also usually present at the higher voltages. Since silicone rubber insulation can operate up to a copper temperature of 200C and since it has unmatched corona and ozone resistance, it is ideally suited for this application.

* * *

High bay lighting in moist locations has long presented a problem in the maintenance of fixtures. Silicone rubber fixture wire, because of its heat resistance and moisture resistance, is solving the problem in a growing number of industries. At our Waterford plant, our electricians have used silicone rubber fixture wire to replace conventional wiring and have eliminated insulation breakdown in high humidity areas such as our reactor building.

* * *

A number of other interesting commercial applications have developed in recent years. The excellent thermal conductivity, heat resistance, and lack of odor of silicone rubber has led to its large-scale use as refrigerator defroster wire. The heat resistance, moisture resistance, and thermal conductivity of silicone rubber has influenced its use in heating cable for soil heating and for protecting pipes, valves and pumps from freezing. The rare combination of heat resistance and radiation resistance is the basis for the use of silicone rubber insulated cable on a large scale in several recently constructed land based nuclear reactors. There are materials which are more radiation resistant than commercially available silicone rubbers, there are some few materials that are more heat resistant than presently available silicone rubbers, but there are no flexible insulation materials that combine the excellent heat resistance of silicone rubber with good radiation resistance. Sili-

cone rubber insulated and jacketed cables are now used in all of our nuclear-powered submarines. Several months ago, some 65,000 feet of silicone rubber insulated power cable was installed in a Western Pennsylvania telephone exchange as a part of a power renovation project. The cable was used to connect seven new transformer vaults with the central exchange. It was stated by the engineer who designed the system that the silicone cable provides the most temperature-years of any cable available today. Preinstallation tests which subjected the cable to temperatures approaching 3500F in a gas-oxygen flame produced only a barely discernible white smoke and the cable did not convey flame even after being placed in the bluest section of the flame for a period of five minutes.

* * *

So far, we have discussed the past and the present. The future appears to be even more interesting. As I previously mentioned, over the past 12 years, physical properties of silicone rubber have been improved by a factor of nearly 10. Much of this improvement has been accomplished by compounding with more effective fillers. The substitution of vinyl groups for some of the methyl groups in the silicone polymer has resulted in compounds with greatly improved resistance to compression set. The substitution of phenyl groups for some of the methyl groups in the silicone polymer has given us compounds which will retain flexibility down to -150C and which show increased resistance to the effects of nuclear radiation. Additives have been developed which increase the heat resistance of silicone rubber. Many other developments are already in the evaluation stage which will give us improvement in moisture resistance, in flame resistance, and in oil resistance. Silicone rubber is already being used in high frequency co-axial cables up to the 30 megacycle range and it is conceivable that modifications in the basic polymer will yield compounds suitable for use at even higher frequencies.

Any writer who hopes to be objective in analyzing the merits of a material must discuss disadvantages as well as advantages.

* * *

The per-pound cost of silicone rubber is high in relation to the cost of conventional organic insulating materials. One reason for this is the tremendous expenditure in facilities, research, and development that have been necessary to develop the present-day silicones. Before rendering judgment, however, one should consider Navy shipboard cable which is the largest single application for silicone rubber in wire and cable. Small shipboard power and control cables insulated with extruded silicone rubber are equivalent or less in cost than the cables that they replaced.

* * *

Although silicone rubber has good resistance to ASTM No. 1 oil, its resistance to the high aromatic oils, such as ASTM No. 3 is not good. It swells noticeably in these high aromatic oils, even when immersed at room temperatures and, although it recovers its original physical properties to a great extent when the aromatics are evaporated, the engineer who uses silicone rubber in such an environment must use care in the design of his cable.

* * *

Reversion of silicone rubber has occasionally been a problem in the past. It can be controlled, however, very satisfactorily by formulation and by the design of the equipment. Three factors — water, heat and catalyst—are involved and reversion is observed only under certain conditions. For instance, if a compound containing acid or base catalyst is heated for 24 hours at 480F in a sealed tube, it becomes soft and weak. The same treatment in a circulating air oven results only in a slight hardening of the compound. With neutral compounds, the reaction is extremely slow even under adverse conditions.

* * *

To summarize our discussion of silicone rubber as an insulating material; we have witnessed the development, over the past 12 years, of a material which is available from several sources of supply, which is readily processed in continuous lengths on conventional equipment which operates satisfactorily over a wide temperature range (-150F to +600F), which possesses excellent electrical characteristics over a wide range of temperature and frequency, and which is capable of almost limitless modification to meet a wide variety of applications in the wire and cable industry.

REFERENCES

1. **Hatcher, C. T. and Lee, A. R. "High Temperature Power Cable with Silicone Insulation," AIEE Pacific General Meeting — June, 1956.**
2. **Walker, H. P. and VanLear, G. M. "Silicones in Naval Shipboard Electrical Equipment," *Industrial and Engineering Chemistry*, November, 1956.**
3. **Short, L. B. "The Applications of Silicone Rubber Insulated Wires and Cables," Third Annual Symposium on Technical Progress in Communication Wires and Cables — SCEL, December, 1954.**

An Invitation to NON-MEMBERS

You, who have not become members of The Wire Association, are cordially invited to join with us and others in the industry in promoting the progress in wire manufacturing techniques.

Membership in the Association has many advantages, not the least of which is the satisfaction arising from feeling that you are an active part of an organization that has the interests of your company and of you yourself uppermost in mind.

All wire men, whether engaged in ferrous or non-ferrous wire or electric wire and cable production — plant executives, metallurgists, engineers and chemists — should belong. Your industry-member associates would like to have you as members.

DUES: $15.00

Send for booklet and application card

THE WIRE ASSOCIATION

Richard E. Brown, Exec. Secy.
453 Main St. Stamford, Conn.

Bead Wire

This article on tire bead wire has been supplied by The Firestone Tire & Rubber Company, who buy large quantities of bead wire each year for the manufacture of tires for automotive, aircraft and other tires.

There have been many forms of the tire bead and many materials have been tried. When the bead had to be flexible enough to be stretched over the rim there were definite limitations on the bead materials. Beads in these early days were made up of a rubber core, wrapped in cotton cord and coated with rubber.

* * *

When the quick-detachable clincher rim came into existence, the bead no longer needed to be extensible and many combinations of bead types came into use. Rubber cores, ground friction fabric, cord, thread, string and fabric strips were all used, and many methods of assembly were utilized. Of course, as materials were tried much consideration was given to wire, steel rings, wire mesh, twisted cable, etc.

* * *

Of all materials and combinations tried, steel wire in one form or another has been found to be the only material that will safely support the beads of the tire.

* * *

Wire itself has been used in many different forms. In fact, one of the earlier bead forms was a large single wire, practically a rod. Wire has been used which was woven into a braid. It has been twisted into cable form. One of the popular forms for bead wire was strands of parallel steel wire with cross woven wires to form a wire ribbon or tape. Probably the most popular bead base today is the parallel wire system without the cross woven wire. This type is known as "weftless" bead reinforcement.

* * *

The weftless bead reinforcement for tire beads consists of a number of 0.037-inch coated steel wires arranged parallel to each other side by side, to form a ribbon or band, one wire thick. These parallel strands are fed through an extruding head in which they are coated with rubber. Beads of course can be prepared with as many parallel strands as desired. Then, to form the bead ring, this ribbon is wound onto a former in as many layers as desired. Thus, beads can be made 4 strands by 4 strands, or 6 by 6 or any combinations to secure the desired strength. The loose end is secured and this bead core is wrapped with rubberized fabric.

* * *

For preparing beads, a straight, high-tensile wire which is "dead," or lacking in "spring" or "coiling" tendency is used. This property is necessary to allow for working.

* * *

There has been a long period of development to determine the proper size of wire. At various times through the years, a certain size wire seemed to have the right combination of desirable characteristics, and would be on the verge of standardization, when suddenly it would be dropped because of some difficulty in manufacture or in service.

* * *

The starting point in the manufacture of steel wire is a steel rod or an intermediate size of wire. This is reduced in diameter by drawing through a succession of dies of decreasing size, until the desired diameter is obtained. The dies used are tungsten carbide for coarse wire and diamond for the finer sizes.

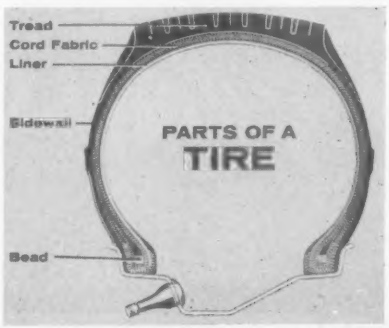


Fig. 1—Diagram showing the essential parts of a tire. The importance of the beads as stabilizing members is evident. The tire assembly is a unified structure of the various elements that make it up. Total performance efficiency of the tire is dependent upon the efficiency of each component. * * * * * * * * *

* * *

In spite of the hardness of these die materials, the dies are subjected to considerable wear when miles of wire are drawn through them. Lubricants are used to decrease friction between the die and the wire and to provide the wire with good surface conditions. The lubricant cannot eliminate all the wear on the die. Dies for bead wire must be accurately made and are prepared so that the original drawing hole is on the low side of the tolerance and with wear it gradually approaches the high side of the tolerance. Once it passes this high tolerance it is replaced, and can be repolished to draw the next larger wire.

* * *

The process of drawing the wire through successive passes has a hardening and stiffening effect which must be compensated. The rod or wire from which the final bead wire is drawn is given the initial desired properties by the heat treating process known as "patenting." This process, in which the rod is heated above its critical temperature, produces a grain structure that provides great strength and makes possible severe cold working.

* * *

Bead wire used today is in the high-carbon group with a range of carbon content from 0.40 to 0.85 per cent. The processing is carefully controlled through all stages.

* * *

After much experimenting with size, the 0.037-inch wire is the gage now most widely used. Some of the physical properties are —

Area in square inches — .001075

Breaking strain (100,000 lbs. psi) — 107.5

Weight (lbs. per 1,000 ft.) — 3.65
Feet per pound — 274.0

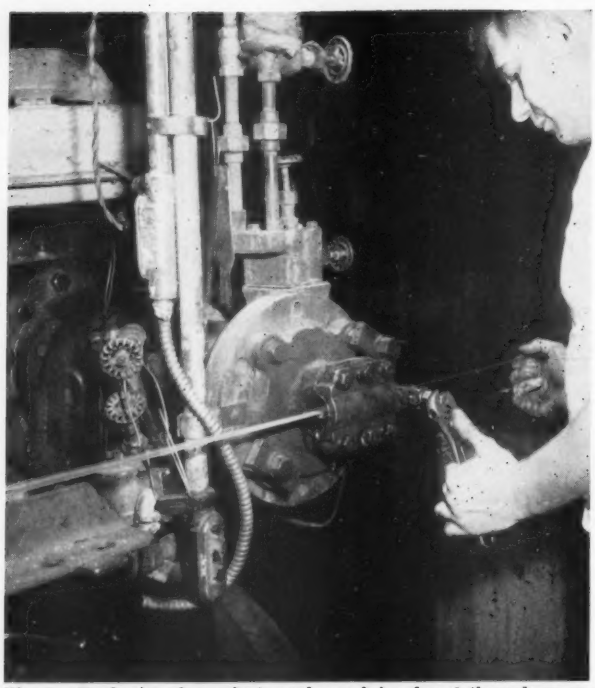


Fig. 2 — Bead wires from giant spools are being forced through an extruder head which places rubber over and around the bead wires. Various die heads can be used to get a four, five, six, seven strand ribbon, as desired. This rubberized wire ribbon is then rolled on a former to create the actual bead unit. * * * * * * * * * * *

Fig. 3 — Finished beads are removed from the bead forming machine. The machine automatically builds up as many strands of rubberized wire ribbon as required, cuts the ribbon and ejects the finished bead structure. These beads are now ready for wrappng or reinforcing. *

The bead wire may utilize one of several different finishes. One of the most common is known as "B.P." (bronze plate). By the process of chemical displacement, the wire is given a coating of copper-tin alloy. Due to certain adhesion characteristics, the amount of tin is held to a minimum.

* * *

The coating is used for two reasons: for better adhesion to the rubber and for anti-corrosion protection. Rubber does not adhere well to bare steel wire or to tinned or zinc-coated wire. It adheres best to copper and its alloys. The adhesion is tested by the pounds pull test — a test where the force required to separate the tire from its rubber pad is measured.

* * *

The bronze-plate finish does not provide much resistance to corrosion, but by providing better adhesion, the rubber itself prevents moisture from reaching the wire.

* * *

Tire beads must be tough and durable. Some of the deteriorating forces are fatigue, stresses, poor adhesion, vibration, corrosion, heat and abuse.

* * *

Fatigue results from repeated stress which at no one time is as great as a single stress which would cause the failure. Repeated stresses may cause a work hardening of the steel, leading to easier rupture. These bead failures, compared to earlier years, are very rare.

* * *

When the adhesion between the bead wire and rubber is poor the wire may move or vibrate independently causing a separation between the metal and the rubber.

Fig. 4 — The model is completely wrapped up in the bead wire from one passenger car tire. The 120 feet of copper-clad wire is built into the important bead structures of a tire to give it strength and rigidity. Steel wire is also used today in making actual piles for tires used in heavy-duty service. The wire cord is used in place of synthetic fibers. * * * * *

* * *

A tire that fits tightly on its rim is less subject to both corrosion and vibration in the bead regions. The tight fitting bead also keeps out water that could have deteriorating effects.

* * *

Corrosion is not the problem it once was due to better adhesion and better wire coatings. Damage to the tire or bead in installation or in an accident may expose a wire to corrosion which sets up a deteriorating cycle.

* * *

In a tire bead, any continuous motion of a wire or portion of the bead will generate heat in sufficient quantity to break down the rubber surrounding it. A very important source of heat in the beads is the braking heat. A good example is in an airplane landing when the brake drum may become red-hot. This heat must be dispersed rapidly or it may have a bad effect on the tire beads.

* * *

The size of the finished bead is an important factor and it therefore is necessary to have a very tight fit between the bead and rim.

* * *

The chief function of the steel wire that forms the heart of tire beads is to hold the tire on the rim. The bead structure resists the action of the inflation pressure, which tries to force it off, and it opposes the operational stresses which also tend to force the tire off the rim. The vehicle load is transferred from rim to tire through the bead structures.

* * *

The great significance of bead wires in tire building is very evident at Firestone or other tire plants. Steel wire is not a newcomer to tire structure. Both the old and new roles are evident in a short trip to Firestone's facilities in Akron.

* * *

In a museum, located in the company's modern research laboratory, there is a device, used in 1900, to secure or fasten solid rubber tires to buggy wheels. This is the invention upon which **Harvey S. Firestone, Sr.** founded The Firestone Tire & Rubber Company.

* * *

Originally, rubber tire stock was prepared in lengths with two longitudinal wires in the tread to hold them in the wheel channel. Many devices were proposed to improve the security of the tires on the wheels.

* * *

The invention on which the Firestone company was founded was known as the side-wire solid rubber tire. The idea was to install short, horizontal wires on rods at intervals through the tire rubber near its base, wrap the tire around the wheel groove, and fit its ends neatly together, then force an endless wire ring around each side of the tire and over the projecting ends of the cross wires.

* * *

Then came the pneumatic tire; and since the first attempts left much to be desired, Firestone continued with side-wired solids until the pneumatic became more practical. One of the early difficulties with pneumatics was that of holding the tire on the rim.

* * *

In 1904, Harvey Firestone's application to make clincher tires was rejected by the interests that controlled clincher patents. So, he and an engineer began a search for a way to omit the clincher construction and yet produce a workable pneumatic tire. A non-clincher bead reinforced by steel wire was selected, the wire being in the form of a cable. A method of securing the tire to the rim by means of bolts and metal plates was worked out. The new straight-side tire was test run in 1905 and soon offered for sale.

* * *

From the beginning, it was evident that wire beads of some type were essential in holding the tire on the rim. Wire bead structures underwent many changes through the years, and today they are a necessity in good tire construction. The amount of steel wire consumed in tire construction is a revelation of its importance.

Extent of Use

In making a set of tires for the Boeing B-52H missile bomber, Firestone uses about 14 miles of copper-plated steel wire in the beads. In a production of 2,000 sets of tires for the bomber, a weight of wire would be utilized equivalent to the weight of one of the bombers.

* * *

A 7.50-14 passenger tire requiring only single bead units uses 127 feet of steel wire in its beads.

* * *

A giant 36.00-41 earthmoving tire with triple beads on each side uses 5½ miles of bead wire.

* * *

It is in production terms that steel wire emerges as an extremely important item in tire construction.

In Firestone's six domestic tire plants, more than 1,000 tons of steel wire are used in one month in constructing beads for passenger, truck, off-the-highway, agricultural, and aircraft tires. In one year, these plants use over a million miles of wire in bead construction. In all Firestone plants, domestic and foreign, wire is utilized at the rate of 5,000 miles per working day.

* * *

In space age terms, the wire utilized by Firestone plants in one year would follow one of our man-made satellites around the world on more than 50 orbital passes.

* * *

In domestic plants in one month, the wire used in bead construction would lay 135,000 strands across the George Washington Bridge; and they would support the 3,500-foot span with a high margin of safety.

* * *

If the month's consumption of bead wire were woven into a wire mesh, it would form a wire screen, of smaller than 1/4-inch squares, around the 14 acres of Rockefeller Center. It would reach as high as the radio tower of the Empire State Building, which extends some 1,450 feet into the air.

* * *

Using the production figures of the Rubber Manufacturers Association, it can be estimated that over 300,000 tons of steel wire is made into bead structures by all tire manufacturers in the United States in one year.

Attendance Lists Available

A List of those who attended the Regional Meeting of the Electric Wire & Cable Section of The Wire Association in April is available at a cost of $3.00 per copy. Please send orders to:

WIRE AND WIRE PRODUCTS

453 Main Street,
Stamford, Connecticut

A Unique System of Gauge and Tension Control in a Steel Mill

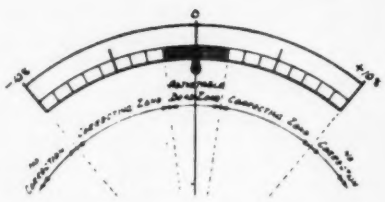
by Leo Walter
Consulting Engineer
Painswick, England

This gauging and tensioning device is in use in a British steel works.

An automatic control system for tinplating which is claimed to be unique in the world is briefly described in the following pages. Its simplicity and low cost make it superior to elaborate schemes in operation in other mills. The system has been designed by the users themselves, based on many years of practical experience in tinplate manufacture. The new system of automatic gauge and tension control for production of a more consistent tinplate product and a reduction in off-gauge material, has been devised by **Richard Thomas** and **Baldwins Limited,** Ebbw Vale Steelworks, Great Britain. The system now has been in operation on the five stand cold reduction mill at Ebbw Vale for over a year and accepted as a reliable aid to mill stability by both management and operating personnel.

* * *

First a study was made of some of the automatic gauge control systems manufactured and in use on other plants. These were all found to be extremely complicated as well as calling for expenditure of very large sums of money. Further, they had the disadvantage that they were based on a scheme of rolling which differed from that being used at Ebbw Vale. Thus, if automatic gauge control of the conventional type was introduced, it would mean that, should it fail, the operators would have to revert to a method of manual rolling to which they were unaccustomed.



X-Ray Gauge Meter.

Fig. 2.

* * *

With this in mind, Ebbw Vale electrical engineers designed a gauge sampling system initiating correction by means of pulses. The designs became a reality with the manufacture in the Instrumentation and Special Engineering Section of the Electrical Engineering Department of a gauge and tension control system based on the principles shown in Figures 1 & 2.

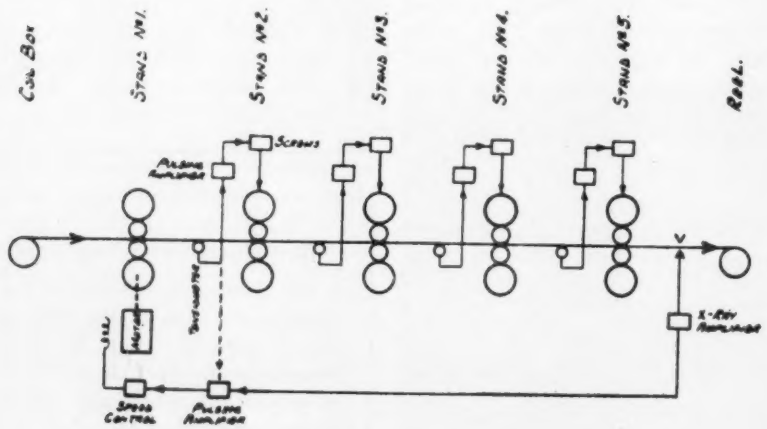
* * *

As can be seen from Figure 2, the control covers a total range of ± 10% of the preset gauge, and of this the inner dead band covers an adjustable area from 1% to 2%; this is the area within which no control is needed. The control is then applied to correct errors in gauge up to the limit of ± 10%. Beyond this range, it is considered that the mill set-up is likely to be faulty, and the equipment then cuts out automatically and an alarm is given so that the set-up can be brought within range by manual means.

* * *

The circuitry is so arranged that the length of each individual correcting pulse is a function of the error signal. The larger the error the longer the correcting pulse, while the overall pulse time can be preset to the desired value which will give the maximum correction without instability. The adjustment of the space time between pulses is also possible and can be preset to allow the correct sampling time. It should be noted that there is no automatic change of the sampling time in line with the speed of the mill, because it has been found that the advantages to be gained from this complicated piece of equipment are relatively

(*Please turn ot page* 926)

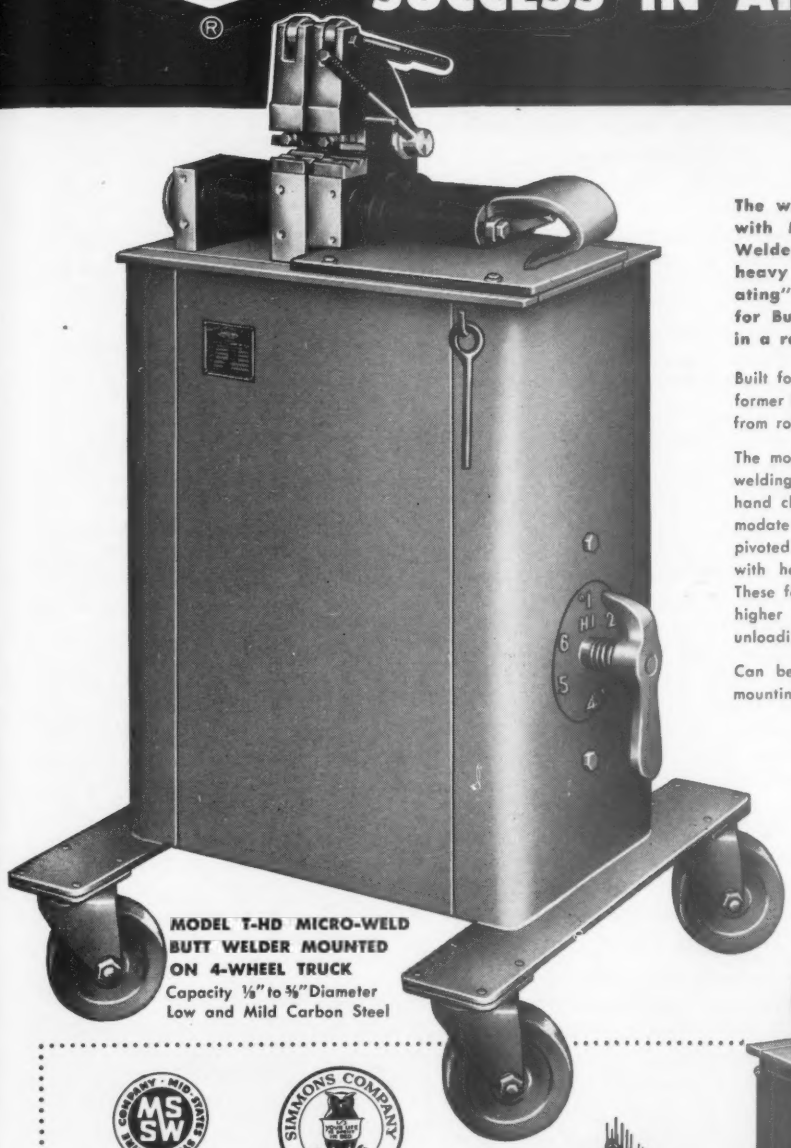


Schematic Arrangement Of Auto Gauge/Tension Control. 5 Stand Mill.

Fig. 1.

MICROMETER PRECISION – MICRO-WELD ®

CO-OPERATION . . . THE KEY TO SUCCESS IN ANY FIELD!



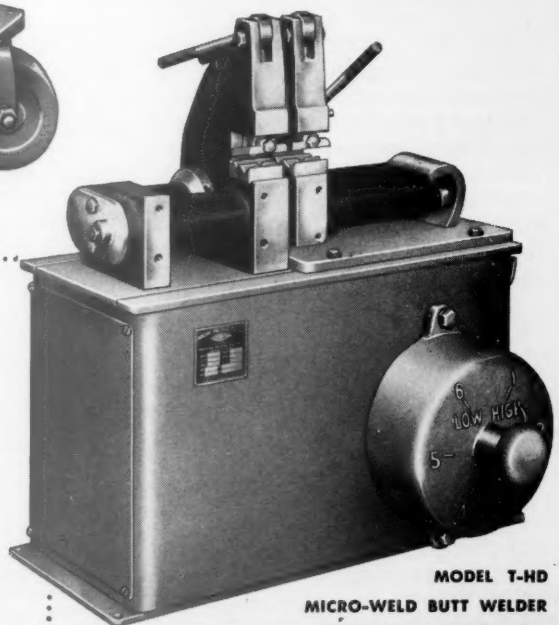
MODEL T-HD MICRO-WELD BUTT WELDER MOUNTED ON 4-WHEEL TRUCK
Capacity ⅛" to ⅜" Diameter
Low and Mild Carbon Steel

The wire industry of the American hemisphere co-operating with MICRO PRODUCTS COMPANY developed efficient Butt Welders for the world of wire . . . Model T-HD MICRO-WELD heavy duty Butt Welder has proven it's worth in "co-operating" with cold heading equipment, and other requirements for Butt Welding low and mild carbon steel wire and rods in a range of ⅛" to ⅜" diameter.

Built for heavy duty service, headpieces are made from bronze, transformer housing and truck are combined into a substantial unit, fabricated from rolled steel plates and arc welded.

The model T-HD MICRO WELD Butt Welder is a general purpose butt welding machine, equipped with manual spacing mechanism, individual hand clamps, manual spring upset mechanism, welding dies to accommodate the full range of sizes without changing dies, self-equalizing pivoted clamping shoes operated through simple positive cam clamps with heavy inserted coil springs to compensate for size variations. These features together with conveniently located controls contribute to higher production with a minimum of time required for loading and unloading.

Can be supplied mounted on 4-caster wheels or suitable for bench mounting.



MODEL T-HD MICRO-WELD BUTT WELDER Suitable For Bench Mounting

MSW COMPANY · MID-STATES STEEL & WIRE

SIMMONS COMPANY

ACCO TRADE MARK

CONTINENTAL STEEL

LACLEDE

STELCO

CF&I

These are some of the users of model T-HD MICRO-WELD Butt Welders.

MICROMETER PRECISION – MICRO-WELD ®

MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE • CHICAGO 6, ILLINOIS • TELEPHONE STate 2-7468

Observations Upon Production Planning and Control in a Steel Wire Mill

by D. W. Bedford
Assistant Production Manager
Frederick Smith & Co. Wire Manufacturers Ltd.
Caledonia Works
Halifax, England

This paper was presented by the author on November 22, 1960, at his company's Staff School. He joined the firm in 1940. It is published through the courtesy of Frederick Smith and Co. Wire Manufacturers Ltd., one of England's leading wire producers.

The object of providing and financing a production planning and progress department is to help management to produce goods in the required quality, at the required time, at the lowest possible cost to the Company. As an entity, it is of no value to the Company if its activities do not do this. Therefore, at regular intervals, the question must be posed — is anything being done, or asked for, which does not help materially in the delivery of the end product?

* * *

Systems of recording, checking and re-checking, must have a positive value, and any work which is done because "it has always been done like that", but for no other apparent reason, should be challenged. For example: if two sections of the department require the same information about the weight of material produced —one for the payment of piece rate wages, and one for the supply of information to the Works Manager — the same physical weighing of the material is used by both. However, unless there is constant observation on the activities of different sections of the department, one finds the same information being recorded twice and possibly even supplied on different occasions.

* * *

In order to set the outline of a system, and thus demonstrate the possibilities — as well as the possible shortcomings — it is proposed to enumerate the type of records and information entered thereon. The actual planning is usually done in two distinct phases, but the information is obtained from the same records, which will be described.

* * *

The general production picture is compiled weekly, and proposed tonnage outputs agreed for each department or group of machines. During this process, the Production Manager will indicate certain orders which must be included, and the balance of the tonnages are then built up from current orders in such a way that the greatest economy possible is achieved by the avoidance of machine down time arising from changes in manufacture. Due to the variation in size and quality a strictly numerical sequence of orders cannot always be adhered to, and the age of the order must often take second place to the economical arrangement of manufacture.

* * *

The second phase of planning is the detailed breakdown of each item of each order, and the issuing of necessary written instructions to provide a continuous supply of material at the start of each process and wiredrawing machine. Factors affecting this detailed planning are: —

a. **The maximum amount of material agreed to be in process of manufacture at any given time. (i.e.) The total amount of money to be permanently tied up in this way.**

b. **The maximum amount of material that it is possible to have in process of manufacture at any given time due to the restriction of available storage space.**

c. **The degree of interference of the scheduled programming by the introduction of priority work authorised by top management. Although good policy reasons exist for such exceptions, the solid fact remains that complete re-writing of programmes may be necessary, and the repercussions of obliging one good big customer will usually necessitate administrative work in connection with many small customers whose orders have been pushed back. Such work is not usually taken into account when assessing the amount of clerical man hours required to work the proposed system, and of course the fluctuation cannot be determined in advance, so long as any priority system exists.**

d. **Steel rod supplies which do not yield physical properties in line with standard procedure and anticipated test results. This can also necessitate re-writing of programmes and re-allocation of material.**

* * *

The aim of this detailed planning should be to maintain adequate stocks of inlet material for each process or drawing machine, to allow for the effect of any of the above factors, and yet enable continuous production to be maintained. A regular revision of these stock levels should be undertaken to ensure that no unnecessary quantities are carried, thus holding a balance between economic desirability and practical requirements. The requirements of sections which have to do planning in a secondary way must also be remembered, and adequate time allowed for:

a. **Providing tools, wire drawing dies, consumable stores.**

b. **Movement of material.**

c. **Preparing progress forms, test record sheets, stock records.**

* * *

On receipt of an order from a customer, an acknowledgment of receipt and acceptance of the order is prepared by the Sales Office; duplicated copies of the acknowledgment become internal order copies and are supplied to all affected departmental management.

* * *

Instructions to the works are

contained in the Works copy of the order which gives the information necessary for the manufacture and despatch of the commodity, i.e.:

a. Works Order number.
b. Customer's order number.
c. Description of type of wire.
d. Weight of order.
e. Any physical specification details, such as tensile strength required.
f. Any particular specification reference applying to order, or special instructions, or deviations from standard practice.
g. Date of order entry.
h. Date of delivery required by customer.
i. Date of delivery estimated by sales department.
j. Any final delivery dates known to be necessary to meet shipping, licensing, or letter of credit requirements, etc.
k. Reference to previous orders for similar material.
l. Method of packing required.

* * *

Copies of the Works Orders are supplied to:

a. Works Manager — For information only.
b. Production Manager — For use as works copy from which to extract all information relative to the manufacture, inspection and despatch of the order.
c. Inspection Department Superintendent — For use as Inspection Department copy from which to extract all information relative to the Inspection of the order.
d. Warehouse Superintendent — For use as Warehouse copy from which to extract all information relative to the packing and despatch of the order.

* * *

Various sections of the commercial department also receive copies, but their function is outside the scope of this paper, and they are not considered here.

* * *

On receipt of the Production Manager's copy the first job to be done in the planning and progress department, which is directly under the control of the Production Manager, is to carefully read through the order and classify it under one of the following categories:

a. Orders to be taken from wire held in stock.
b. Orders to be held under suspense pending receipt of customer's instructions, or license, letter of credit, or other authority to produce.
c. Orders for immediate production for the home market.
d. Orders for immediate production for the export market.
e. Amendments to orders.

* * *

In the case of items coming under category (a) it is then necessary to write instructions for the withdrawal from stock of the particular item. This written instruction must be in duplicate, the copy being attached to the works order copy which is ultimately filed in numerical order with the appropriate test record, and remain as a permanent record of the order in the progress department. The original provides the authority for the following actions, being passed along as each section has made use of it.

a. Inspection department to prepare test record of the item.
b. Warehouse to take item from stock area, pack as required, and despatch.
c. Commercial sections holding current stock sheets to remove item from the stock sheet as being no longer available.

* * *

All suspended orders — category (b) — are simply filed separately as such, until released for production.

* * *

For each item on all orders in categories (c) and (d) above an index card is prepared; these cards are then filed in a visual system according to:

a. Order number (i.e. denoting order of receipt).
b. Whether export or home.
c. Size range according to department in which finishing drawing will take place.
d. Special type of finish other than bright or galvanised finish (e.g. Tinned, Hardened and Tempered, Cut lengths).

* * *

On the face of each index card, along the bottom ¼" which is visible when filed in the system, spaces are provided for the following information, which is copied from the works order copy, or from the appropriate specification quoted on the order:

a. Size in decimals of an inch.
b. Tensile range required.
c. Type of finish and quality of wire.
d. Special delivery instructions.
e. Previous reference to similar quality.
f. Weight required.
g. Order Number.

* * *

The remainder of the card provides for the entry of the manufacturing procedure; spaces are provided for the following details:

a. Date of start of manufacture.
b. Size, Supplier, and carbon content of rod from which wire is to be made.
c. Whether patented or not in rod.
d. Number of machine on which first drawing is to be done.
e. Size to which first drawing is to be done.
f. Subsequent heat treatment.
g. Details of cleaning and coating or galvanising before final drawing.
h. Number of machine on which further drawing is to be done.
i. Any special finishing processes(e.g.) Tinning, Cutting or Hardening and Tempering.
j. Weight produced against issue in final drawing.

* * *

The reverse of the index card has spaces for two distinct and separate entries. On the left hand side are entered details of any wire transferred from order due to non compliance with specification:

a. Date of entry.
b. Reason for rejection.
c. Order to which wire is transferred.
d. Weight of wire transferred.

* * *

On the right hand side are entered details of wire sent to order:

a. Date of despatch.
b. Weight of wire despatched.

* * *

It will be seen from the foregoing paragraphs that a complete record of work done against each item of each order is maintained on a separate card, which provides an easy reference, when filed with the order copy on completion.

* * *

After the details already mentioned have been entered on to the card, it is filed in the visible system tray. The cards are now arranged in batches, grouped according to: —

a. Order number, i.e. the sequence in which the orders were received.
b. Special finishes other than galvanised or bright.
c. Whether fully issued, or part or whole item still to be issued.

* * *

Thus one is provided with a ready reference to the load of work behind any set of wiredrawing machines, or special finishing department.

* * *

To enable the flow of work to be planned it is equally essential to

have up-to-date and easily accessible knowledge of steel rods, our raw material. This is achieved by using a similar card system. The bottom ¼" on the face of the card now carries the following information, supplied daily by stores:

a. Size.
b. Supplier.
c. Carbon content.
d. Manganese content.
e. Cast number.
f. Order Number on rod supplier.
g. Number of rods in batch.
h. Weight in batch.

* * *

As material is issued to jobs an entry is made on the appropriate raw material card showing:

a. Date issued.
b. Whether issued as patented or unpatented rod.
c. Drawing machine to which issue is made.
d. Size to which rod is to be drawn.
e. Weight issued.
f. Running total of weight issued to date out of batch of material.
g. Result of laboratory check as to suitablity and grading.

* * *

The following information is therefore easily accessible when required:

a. Balance of material of any batch remaining for use.
b. Use to which material has been put to date. From this, useful information as to how steel is working can be obtained to forecast more exact results.
c. In case of failure to meet specification of finished wire, the whereabouts of the whole batch can be quickly ascertained, in order to stop production, or take remedial action.

* * *

It is the policy of the firm to produce each order in the weight, and to the specification as ordered; this due to the practical and financial impossibility of carrying stock to cover the wide diversity of physical requirements commonly in demand. Therefore each item must be dealt with separately and issued to be produced from the appropriate carbon rod. It is possible however, and economically necessary, to carry a stock of patented rods as well as a stock of unpatented rods over the range of carbon content commonly used. For this reason rods are patented to stock, and a stock list, which is progressed and kept up to date each 24 hours, is maintained to be used in conjunction with the raw material card mentioned above.

A record must be kept in the progress office showing the loading of all machines and plants to enable forward planning to be done, and new work introduced into the production flow as economically as possible in line with delivery obligations. This record is purely for working use on a day to day basis and has no value as a permanent record. Therefore it can be either in the form of a daily prepared form after checking the up-to-date progress on all machines and plant, or preferably on a talc covered work-in-progress board. This can then be amended as work is issued, using a chinagraph pencil, and progress information used to confirm the position rather than prepare a completely new weigh up each day. The information necessary on such a board is:

a. Date when the details are brought up to date.
b. Name of each section or department.
c. Number of each machine or item of plant.
d. Size of wire being produced on each machine or item of plant.
e. Estimated time and date of completion of issued work.
f. Details of shift being worked on each machine or item of plant.
g. The amount of work in course of preparation for each group of machines or special finishing department. A certain minimum level will be necessary to provide a working feed, and it is to ensure that such inlet material is available that this detail must be recorded.

* * *

The mechanics of issuing work to the various machines involves the work-in-progress board, described in the foregoing paragraph, being scanned and all plant requiring new work within the next 48 hours is marked up. Each group of plant is then taken in turn and considered as a group in order to maintain a balanced amount of work throughout the group. Before allocating work to machines it is necessary to consider and take into account such details as:

a. Length of run without change on machine.
b. Finishing size (i.e.) whether at thickest or smallest end of range in group.
c. Whether machine has any peculiarities which prevent certain classes of work being drawn successfully.
d. When new work is required in relation to availability of raw material.
e. Whether job can be drawn, inspected, packed and despatched without intervention of week-end if of special unoiled finish.
f. Whether minimum weights of inlet in course of preparation is being maintained to ensure continuity in ancillary processes of patenting and galvanising.

* * *

The item is then selected and method of manufacture calculated and written down on the face of the index card showing details as described in the paragraph describing card entries of manufacturing procedure.

* * *

From this information, a combined job instruction and progress form is written out for each process. For example, a job for small wire in tinned hardened and tempered finish would require separate issue forms as follows:

a. Issue to heavy wiredrawing machine to inlet size.
b. Issue to patenting furnace.
c. Issue to intermediate wiredrawing machine.
d. Issue to small wet finish wiredrawing machine.
e. Issue to hardening and tempering battery.
f. Issue to tinning plant.

* * *

Each of the forms contains space for the entry of the weight of work done as it is weighed off by the operator. The forms are clipped to a progress board adjacent to each machine or item of plant, and a daily check is made to record the amount of work done during the past 24 hours, and the running total of work done on each order.

* * *

This information is of value to progress and planning personnel in helping to formulate forward loading programmes, and also in ascertaining what degree of efficiency is being achieved on the plant. In addition it serves production management as a most useful record of work done which can be referred to when matching previous work of similar nature, or forecasting delivery dates for the information of the sales section, and of course valuable statistical information can be extracted from these details by the costing section.

* * *

These daily progress weights are entered on weekly forms, with each group of machines or plant on a separate form. The collection of 52 weekly forms occupies comparatively small space and provides a good picture of the year's work

for the particular group. The weekly progress forms show:

a. Name of group of machines or plant.
b. Date at start of week.
c. Column for order number.
d. Column for finishing size.
e. Daily column for booking of running total.
f. Column for size and quality of inlet material.

* * *

These weekly sheets now become the progress record of each group of machines or plant, and it is from this batch of forms that the work of providing the inlet material to the machines at the right time can be achieved.

* * *

Due to the higher rates of output of modern plant and wiredrawing machines it is not possible to put more than 8 to 16 hours work behind each machine because of space restriction. In order to regulate this amount it is necessary to issue detailed instructions to the cleaning yard for the preparation and delivery of inlet material.

* * *

This work is done daily and is formulated from the daily information collected on to the weekly progress sheets of the wiredrawing machines, showing what inlet is required and at what time; and from the weekly progress sheets of the patenting furnaces showing what inlet is available and at what time.

* * *

In issuing a job for wiredrawing, the progress form is used for the purpose of recording the die draft appropriate to the inlet material and finishing size specified; the form is routed through the die department and an appropriate set of dies is assembled. The dies and the form are then placed in a rack to provide at least 48 hours loading behind every machine. Where weight of items permit, long production runs are planned but unfortunately, from a production angle, the majority of items allow runs of only 24 to 72 hours, with exceptions at both ends of the scale. Small items between 7 lbs. and 5 cwts. do have to be done on occasions; then it is necessary to set up specially and, of course, the amount of time occupied in writing instructions, preparing drafts, and recording information is exactly the same as for 20 Ton items. For this reason, the manufacture of a large number of small items must be so arranged that they are interspersed between larger items over a reasonable period of time.

* * *

Clerical staff time cannot be based on the assumption that x number of items are to be dealt with per day, and then suddenly make time to do the work necessary to put treble the number of orders into production. For this reason, the introduction of small weight orders into the system tends for inefficiency and it is often necessary to put through small items and samples on a separate line altogether.

* * *

To do this, one must make use of time which is really allocated to some other task. For example, the superintendent, whose job of supervising the operation of machinery and process plant calls for constant attention, is asked to put into the line certain small samples — this apparently tiny proportion of his daily task can take up to, say, an eighth of his total working day. This is bad practice and a waste of time for the superintendent, which can be ill afforded. Nevertheless, such work must be done and unless the size of firm warrants a special man, or section, to deal with samples and small weight items, exceptions will have to be made.

* * *

When completion of work in hand approaches, the wiredrawer concerned goes to the rack of orders and dies for his next job. The progress form is attached to a progress board adjacent to the machine, and as the work is done, the weight of finished wire drawn is entered on the form by the wiredrawer. This provides the source of information for the progress clerk from which to compile his weekly progress sheets, with an entry made every 24 hours for each machine.

* * *

As each item is drawn, the progress form and dies are returned to the die room by a member of the die department staff, and after checking off the returned dies, the forms are passed to the progress section; here the weight produced against an item is entered on to the index card for that item, alongside the weight originally issued. If, for any reason such as short weight rods — mixed inlet — or transfer of inlet — the weights do not correspond, the card is taken from the tray so that action may be taken to make a further issue and so make up the required weight without undue delay.

* * *

Wire is transported to the inspection department more or less as it is drawn, and thus the final weight of approved material is soon known from this source. Since a description label must accompany the wire from the inspection department to the warehouse, this is made out in duplicate and one copy is sent to progress office; this, when attached to the master card, confirms that the required weight is now in warehouse, or shows that less weight is available due to some cause or other.

* * *

The cause of short weight is revealed when the test sheet showing a quantity of rejections due to non-compliance with specification is passed from the inspection department to the progress office, and the reason for rejection, destination of rejected material, and weight are entered on the reverse of the master card. As in the case of other causes of short weight the card is removed from the tray for the immediate make up of the required weight.

* * *

The wire is now in the warehouse ready for assembly into sendings. As these sendings are prepared for despatch they are divided into two groups — wire for export in one group — wire for delivery in the United Kingdom in the other. As a sending of wire is ready it is entered on to a daily despatch sheet showing:

a. Date.
b. Order number.
c. Size.
d. By what transport for home delivery.
e. Weight.
f. Destination.
g. Total for home delivery.
h. Total for export delivery.
i. Grand total.

* * *

When the copy of the daily despatch sheet is received in the progress office, the details of each item are entered on to the respective index card, so that there now exists on the one card a complete history of the receipt of order, manufacture, and despatch. If the sending completes the item, the card is attached to the works copy of the order and filed in numerical sequence along with the test sheet covering the item, thus providing a complete history for any necessary back reference.

* * *

From the foregoing it will be seen that every item on order is entered into the progress system in such a manner that it is automatically reviewed daily until put into production, and then automatically brought to light if the planned work does not materialise. When, then, can one not always satisfy the customer on the question of delivery to specified times and in specified quantities?

* * *

The main reason for failure to keep all delivery requests and estimates is the number of clerical man hours required to operate the system. If one were dealing with a standard commodity such as toffee, or bricks, where the recipe or formula remained constant in a given number of types or grades, and the variant was quantity, one could arrive at a number of clerical man hours necessary. But when possible variants include:

Size, (in thousandths of an inch from .005″ to .160″)
Tensile strength,
Types of surface finish,
Types of wire requiring non standard processing,

plus the most important factor of weights, varying from say 7 lbs. to 60 tons per item, it becomes impossible to vary the available man hours according to the surge of work. Thus, repetitive, routine work which must be done daily in order to keep the production flow moving must take priority, and the amount of time left to implement the system so far as small weight orders, re-issuing of make-up weights etc., must receive less than the necessary share of attention.

* * *

A further reason for difficulty in complying with delivery dates is the uncertain supply of raw material in the correct quality and quantity. Whilst bearing in mind the requirements of individual orders, attention must first be paid to providing sufficient work to each section of the factory to achieve continuous and economic production. It is useless to concentrate on one section of the works to oblige one's biggest and best customer, if one is paying wages and overheads for idle plant in another section. Thus, raw material may be to hand for a certain job but due to general plant loading demands may have to be used for something entirely different.

* * *

Whilst these reasons may be based on facts which are not in dispute, the reputation of the firm — and relations with customers, are bound to suffer if some steps are not taken to pass on as much information as possible regularly. Again, the information is available to be passed on if sufficient time is allocated to the task. It is usual for sales department requests for information to be dealt with on a daily basis, originating from customer's letters or information about customer's requirements in the possession of the sales department. However, it is suggested that a more useful extension of this service would be the supply of information from progress office to sales department concerning orders which were not being produced to normal, or required, delivery dates. This would involve a more detailed recording of any items not proceeding through the factory in line with the intention at the time of entry.

* * *

To prevent such information becoming out of proportion to the economical time allowed, greater attention must be given to the accepting of orders under definite delivery promises. It is realised that sales department must retain a certain degree of flexibility in this matter, or the loss of many orders would result merely from slavishly following some pre-determined production schedule. Any production schedule can be altered, if due regard is paid to the effect on work already under promise for a particular date.

A regular weekly meeting between departmental heads from sales departments and production departments should be held to agree certain overall backing behind each group of wiredrawing finishing machines and ancillary finishing processes. This meeting should agree:

i. The shortest delivery date possible for normal non priority work.
ii. The shortest delivery date possible for top priority work.
iii. The orders which are to be affected during the following week, or have been affected by the introduction of top priority work.

* * *

It is suggested that information about specific orders should not be dealt with at such a meeting, but should go through the normal daily channel between sales departments and progress office.

* * *

The following points emerge as requiring careful consideration and attention when attempting to fulfil the requirements of a production planning and progressing organisation:

a. Adequate clerical man hours are made available to cover the requirements of the system under the average conditions of business, making due allowance for such factors as a high proportion of low weight items requiring a disproportionate amount of clerical work and a short process time in the works, together with a proportion of rejections, short weight production, transfers, and unsuitable raw material.

b. Adequate information is passed between sales departments and progress office, in each direction, as a *routine* measure, so that unnecessary checks and enquiries of a non routine nature are cut to a minimum, and service to the customer improved as much as possible. In this respect it has been observed that enquiries out of the normal routine occupy much more time, and cause more interruption to routine procedure, than would be the case with more exchange of information as it became known.

c. Any additional work introduced into the routine requirements of a planning and progress office should be studied and timed in exactly the same way that the output from a new plant or process is observed. Only in this way can it be ensured that all the laid down procedures are carried out, and required information obtained. Overloading of clerical staff who are responsible for provision of data used in planning and control completely defeats the primary object of getting all the relevant facts. Each member of the progress office team must know why certain information is required,

(*Please turn to page* 928)

Sylvania Dedicates and Opens New Weld Plant

A new plant at Warren, Pa., for the production of welded components for the electrical-electronics industry was formally opened on May 16, 1961, by the Parts Division of **Sylvania Electric Products Inc.**, a subsidiary of General Telephone & Electronics Corporation.

* * *

Because the new building and its manufacturing equipment "are the most modern in existence, designed specifically for weld production," according to **Merle W. Kremer**, Vice President and general manager of the Parts Division, "it has been possible to confine this complex operation to a building containing only 20,000 square feet of manufacturing and associated space."

* * *

Marion E. Pettegrew, a Senior Vice President of Sylvania, formally placed the plant in operation, noting that the establishment of the new plant is the latest move in a continuing modernization program of the Parts Division. The division, with headquarters here, has eight other plants, four of them in Warren, and one each in Nelsonville, Ohio; Naugatuck, Conn.; York, Pa.; and Titusville, Pa.

* * *

The plant produces automatic leads and custom welded assemblies for such electrical-electronic product lines as receiving tubes, incandescent and other types of lamps, semiconductors, and resistors. The great demand for transistors and other semiconductor devices, particularly, has been responsible for the growth of Sylvania's weld operation over the past several years, Mr. Kremer said.

* * *

An automatic lead consists of two or more kinds of wire welded together to make electrical connections between the current supply and the functional components inside a radio tube or lamp. A custom weld assembly is a piece of wire joined to an irregular or unusual shaped metal part which is used in the manufacture of electronic components.

* * *

Mr. Kremer pointed out in his dedication address that the Sylvania Parts Division, which was formed in 1950, began as a supplier of electrical leads for the company's own tube and lamp divisions. Since that time, the demand for specialized types of welded assemblies for new applications has increased greatly. More than half of the division's weld sales are to outside manufacturers. Sylvania has kept pace, not only in technological developments to meet higher standards of precision, but also in the design and building of new machinery to replace slower methods.

* * *

Citing one example of the capabilities of the new plant and its equipment, Mr. Kremer explained that some of the new machines, designed and built in the division's own equipment development plant, are capable of producing more than one million of a certain type of welded assemblies each week. This is in contrast to a rate of only 200,000 per week under previous methods. He said rate of production has been increased over 500 per cent, while precision and quality were vastly improved over the old methods. Despite the constant emphasis on automatic production, the division's employment has increased each year since the division was formed.

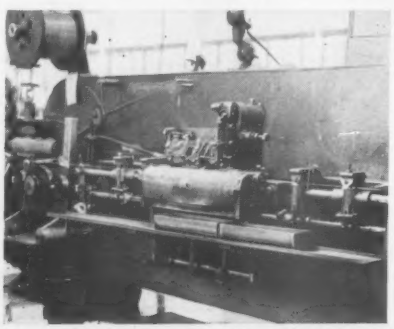


Fig. 1 — New automatic welder straightens and cuts three wires simultaneously, butt welding them together to make leads for electronic tubes.

* * *

In addition to its weld operation, the Parts Division is a highly diversified supplier of metal and plastic parts to a wide range of industries including the electrical-electronic, lighting, computer, photographic, toy, and automotive industries. Parts produced by the division include metal lamp bases, molded plastic parts, wire, wire products, deep drawn metal stampings, and printed metal parts. In addition, it has an equipment development plant and a custom assembly and mica stamping plant.

Research

The division maintains its own metal and plastic parts research laboratory at division headquarters in Warren. While work in the laboratory is limited to short range projects relating to immediate product planning, the division also utilizes the benefits of Sylvania's over-all research and development program.

* * *

Basic research for Sylvania is conducted by General Telephone & Electronics Laboratories Inc. with headquarters in Bayside, L. I., N. Y. The laboratories conduct basic research in many fields including chemistry, metallurgy, fabricating, finishing, electronics, lighting and communications. The fruits of this research, coupled with the division's own engineering know-how, often lead to new and better products and more efficient manufacturing techniques.

Fine Wire and Ribbon

Sylvania's Parts Division is the only manufacturer in the industry that offers fine wire in all three basic types: alloy, clad and plated. It also produces fine ribbon which

(*Please turn to page* 929)

LOST! LOST! LOST! LOST! LOST!

$8,000,000 IN DIAMOND

ELGIN'S
DIAMOND
RECLAIMING
SERVICE
CAN FIND
IT

Every year it is estimated over eight million dollars in diamond goes down the drain in plants that grind and polish with industrial diamond but don't rely on Elgin's ability to recover these precious particles. Why let this happen to you? Write today for complete information. Or, better yet, ask Elgin to study your whole operation from the standpoints of quality and economy.

WE'RE QUALIFIED AND EQUIPPED

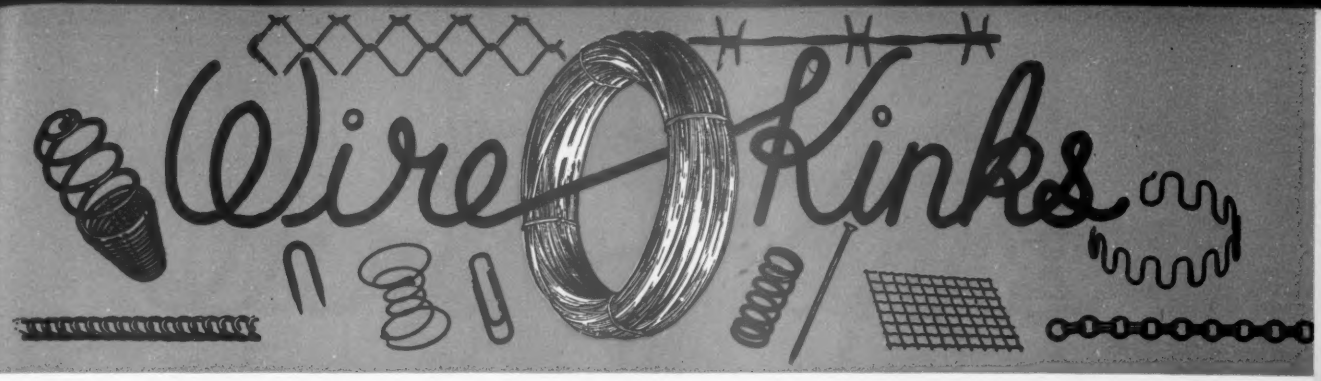
Here's what you do . . . send us your diamond bearing waste in a sealed drum. We guarantee to return all of the diamond content recovered. This diamond is cleaned and regraded to specifications conforming to those of the Bureau of Standards and, upon request, re-compounded with the specified Elgin DYMO vehicle. Either way, there's no diamond loss, and purity is assured.

INVESTIGATE ELGIN'S ASSAY SERVICE

Send a sample of your diamond bearing waste to us and we will assay the potential recovery. This can be a big money-saver!

Abrasives Division
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS

CANADIAN DISTRIBUTOR: B.S.A. TOOLS, LTD., 228 Norseman Street, Toronto 18, Ontario



Reclamation of Diamonds

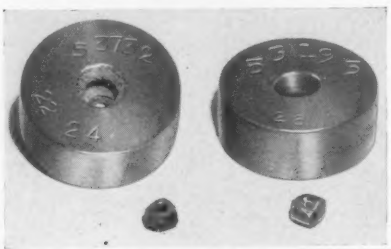
Hawthorne engineers have developed an inexpensive and new method for reclaiming diamonds from junked wire drawing dies and are using them to fabricate diamond-point grinding-wheel dressing tools.

* * *

Formerly when the diamond wire drawing dies had worn or were otherwise unusable the diamonds were salvaged by manual methods and sold, or crushed and used as bort[1] in lapping compounds. The diamonds are now salvaged by a chemical process which requires a minimum amount of operator attention.

* * *

A typical diamond wire-drawing die, Figure 1, consists of four major parts: a diamond; a monel metal body; a monel plug; and fused powdered metal in which the diamond is imbedded.



The worn dies which have diamonds to be salvaged are placed in a suitable vessel, covered with hot water and placed on a hot plate under an evacuated hood. Nitric acid (1.42 specific gravity) is added gradually in small amounts to start the solution action and more acid is added as required to keep the solution action at a fairly rapid rate.

* * *

Since the fused powdered metal, which holds the diamond, is more soluble than the main body of the die the diamonds drop out of their mountings. After the diamonds are washed thoroughly in hot water and separated from any remaining monel metal they are boiled in a solution of hydrochloric acid, washed thoroughly in hot water and are then ready for use in the grinding-wheel dressing tools.

* * *

Originally diamonds for these tools were purchased at a price substantially higher than that of reclaimed stones. Using the reclaimed diamonds, a trial lot consisting of nine dressing tools was constructed by the tool construction department and was tested by several grinding machine operators. On all of the tests the reports from the operators were favorable. The use of salvaged stones in the construction of these tools is now standard procedure.

[1] **Bort is an inferior variety of diamond, often occurring in small spherical masses of grayish color. This term is often extended to include crystalline fragments of diamonds which cannot be used as gems.**

— As reported by F. B. Vavrinek and D. Breeze of the Hawthorne Works in the April, 1961, issue of The Western Electric Engineer.

Readers are invited to send us how-to-do-it items for this department. For each item received that is published we will pay contributors $10.00. Your cooperation will be appreciated by us and our many readers. May we hear from you?

Wire Rope Beginnings

QUESTION

Much is heard and written about the metallurgy, wire processing and constructions of modern wire ropes, but I would like to know how wire rope came into being and how the industry developed. Do you have information on this subject?

ANSWER

The term wire rope embraces a number of products, commonly referred to as cable, rope, strand, line and other descriptive names.

* * *

Wire rope is directly related to the development of methods of drawing steel wire and the industry is approximately 125 years old, although samples of ancient wire ropes date back many, many centuries, when wire was attenuated, not by drawing, but by hammering it out on an anvil.

* * *

A fifteen foot sample of bronze rope, one inch in diameter, used by the Romans 2400 years ago, exists in a museum in Naples. The Chinese are believed to have used wire rope in making rope-ways across rivers some 1500 years back. Indications have been found that lead to the belief that the Vikings used wire rope lashings in the 8th Century, but no positive proof of this exists. In 1644 a Dutch engineer constructed a wire rope-way in Danzig.

* * *

Coming into more modern times, Professor Albert of Clausthal, in Germany, invented a wire rope construction in 1837, now known as Lang Lay. This type of rope was used in England for 40 years before it was patented by a man named Lang, from whom it derives its name.

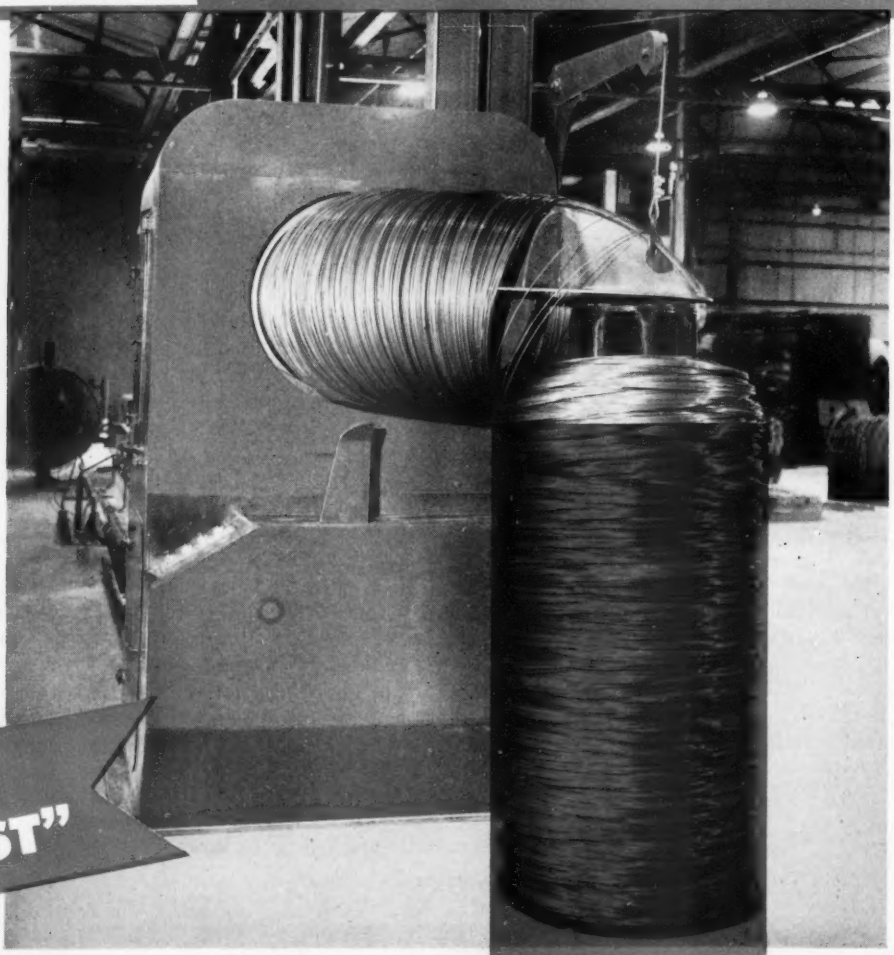
* * *

About the year of 1841 **John A. Roebling** gave rope its start in this country by his decision to duplicate here a type of wire rope developed in Saxony by one Freiberg, which also gave rise to the company that today bears the Roebling name.

* * *

The first basic improvement that gave rise to the modern steel wire rope of high strength was a de-

LIVEN Production Output With Whitacre DEAD BLOCKS



SPECIFICALLY DESIGNED TO FIT ANY INSTALLATION

It's the "GREATEST"

Low Cost and Maintenance...
100% Efficient

FOR WIRE DRAWING

- No stopping for stripping . . . no tangling or snarling
- Requires little floor space . . . extra large package for "in process" wire
- Up to 5000 lb. Coil . . . 25% increase in production
- Features design simplicity . . . capacity up to ¾ inch
- New water-cooled die and block available

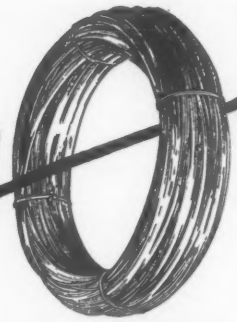
100% EFFICIENT

ADD THIS DEAD BLOCK TO YOUR PRESENT DRAWING EQUIPMENT

Wire Machinery Inc.

5407 S. KNOX AVE.,
CHICAGO 32, ILL.
Phone: POrtsmouth 7-2508

Wire Kinks



velopment by James Horsfall in England in 1854 of a continuous process of heat treating and quenching wire rod. He took out patents in 1854, 1856 and 1858, and the result was referred to as "Patent Wire." This process, much refined over the years, has resulted in the general designation of this product as "patented wire."

* * *

Concurrent with the development of better wire for rope, numerous constructions have been devised to meet the wider variety of applications to which this useful tool of industry is put.

Rusting of Wire

QUESTION

We have considerable difficulty with wire coils rusting in storage or transit. Can you give us any suggestions as to how to overcome this?

ANSWER

A bundle of wire is by no stretch of the imagination a solid mass of metal. It contains a large number of voids filled with air of the same composition as that of the room in which the wire was put up.

* * *

It is entirely possible for wire to be drawn in a room in the summer with the temperature at, let us say, 86°F and 100% humidity. Even at 80% humidity this air would contain 24 grams of water per cubic meter of air.

* * *

When the wire is sent to the warehouse or transported to a customer, should it encounter a drop in temperature to 60°F, the air loses its capacity to hold the full 24 grams of water, as at 60°F it can only hold 13 grams, the excess becoming a dewy deposit on the wire in the trapped voids. Outer strands may not be affected, but the inner ones will rust quickly under these circumstances.

* * *

Air conditioning in mill or warehouse helps little, as changed conditions are likely to be encountered when the wire is shipped. To overcome the factors that cause such rusting, treatment of the wire with anti-rust oils or compounds, or the immediate wrapping of the coils in VPI papers will mitigate the tendency to rust, often eliminating it entirely.

Pickling Inhibitors

QUESTION

I am interested in securing information on the theory and practice of the inhibitors used in pickling steel rod.

ANSWER

The function of an inhibitor is to reduce the attack of the acid on the base metal after it has served its purpose in removing the scale from hot rolled rod.

* * *

There are many types of inhibitor compounds, such as amines, mercaptans, heterocyclic nitrogen, substituted ureas, thioureas, sulfides, aldehides, etc., all of which have the same purpose. They may be soluble in the pickling acid, sulfuric or hydrochloric, or may be colloidal dispersions.

* * *

The actual mechanism of the inhibitor action is not well understood. Some believe that they are negative catalysts that are selective in action, retarding the reaction of the acid on steel, but not on the oxide scale. Others have stated that it produces an increase of hydrogen on the surface of the steel, which maintained on the surface, protects the surface from direct contact with the acid, thus diminishing acid attack. Another theory is that a thin layer of the inhibitor material is adsorbed or plated on the surface of the metal, preventing acid action on it. The fact that some inhibitors are colloidal in nature lends some support to the theory of adsorption.

* * *

Advantages of inhibitor use are a reduction of metal loss, saving of acid, minimizing scrap loss due to over-pickling, decrease in blistering and hydrogen embrittlement. The disadvantages are a small increase in pickling time, possibility of residual film, and the cost of the inhibitor.

* * *

That the advantages outweigh disadvantages may be gathered from the fact that the use of inhibitors is almost universal in acid pickling operations.

* * *

In the early days of wire making, when the chemistry of inhibitors was not a matter of concern, many available materials, some of which were waste products, were found to give reasonably satisfactory results. Among these were tar, fats, rye flour, sour beer, beer yeast, sugar wastes, glue, gelatin, and even urine. Many of the inhibitors used today are derived from organic products of this nature.

THE BUYERS' GUIDE will help you locate sources of supply.

Dependability Quality

Conscientious, skilled craftsmen, operating modern high-speed machines, assure you, the wire insulator, of a smooth-running insulating operation whether it be the enameling of magnet wire or the insulation of electric cables. Laribee Wire will meet your most exacting specifications.

Recently installed equipment, specially designed and built to our specifications, enables us to produce a quality of copper that we believe is not duplicated elsewhere in the wire industry. All operations, including quality control, are under the supervision of a competent staff of engineers.

FABRICATORS OF THE FINEST COPPER WIRE AVAILABLE

Solids . . . Stranded . . . Braid . . . Bunched . . . Cables . . . All bare or tinned

LARIBEE WIRE, Inc.

Camden, New York. Tel: CAmden 42

Waterbury-Farrel Dedicates New Plant

One of New England's oldest machinery builders — **The Waterbury-Farrel Foundry & Machine Co** — opened a new chapter of growth on May 26, 1961, with formal dedication of its new plant, one of the most modern in the industry. The company was founded 110 years ago.

* * *

A division of **Textron Inc.**, Waterbury-Farrel manufactures metalworking machinery used the world over. The company produces wiredrawing and cold heading machines, presses, and rolling mills, including the famous Sendzimir mills used for precision cold rolling of stainless steel and hard alloys, and now for rolling of the new extra thin steel tinplate.

Senator Bush Participates in Dedication

The significance of the construction of the new facility in this area of New England was highlighted by the presence of United States Senator **Prescott Bush** of Connecticut as principal speaker at the Waterbury Farrel open house and dedication ceremonies. Other New England public officials and businessmen were present, as were executives of Textron and representatives of Waterbury-Farrel customer companies.

* * *

The new, one-story plant replaces a century-old, multi-story, multi-building plant in down town Waterbury, ten miles to the north. By eliminating the necessity for moving heavy machinery parts from one floor to another and by modernizing production flow, the new 314,000 square foot factory has substantially increased efficiency, due to a progressive, straight line flow of work from one end of the 600 foot plant to the other. Although there is approximately 20 per cent less floor space in the new production facility, it has the capacity to handle approximately 20 per cent more volume.

Ground was broken for the big new plant in April, 1957 and all manufacturing facilities moved to Cheshire early in 1961, the general offices being transferred from Waterbury on March 1, 1961.

Fig. 1 — Senator Bush (left) and President Mitchell (right) examining a WF eyelet press.

The Parent Company

Rupert C. Thompson, Jr., chairman of the board of Textron, commented that the plant is an example of the manner in which capital furnished by a diversified parent organization such as Textron can bring a completely new competitive life to a company which has been living under the handicap of outdated production facilities. In addition, by moving only ten miles away, the company has been able to keep virtually all of its highly-skilled engineering, research and production personnel.

* * *

Textron companies are in five main manufacturing areas: consumer with 24 per cent of total sales volume; defense, 22 per cent; industrial, 20 per cent; textile, 17 per cent and automotive, 17 per cent. Textron headquarters are in Providence, Rhode Island.

The New Plant and its Products

One of the present seven bays of the new plant had been built in 1957 for construction of the company's larger machines. Subsequently, Waterbury-Farrel was acquired by Textron in 1958. Textron's first move was to study the efficiencies possible by placing all of Waterbury-Farrel's facilities in one plant. Once it was decided to go ahead with the rest of the project, construction moved swiftly. Ground was broken on June 30, 1960. Manufacturing facilities were completed early in 1961 and offices shortly thereafter.

(*Please turn to page* 938)

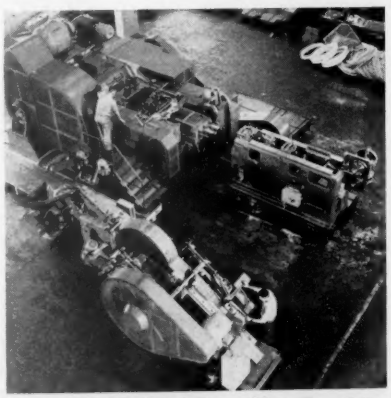


Fig. 2 — Automated bolt making line being tested before shipment. This machine makes 1" diameter x 8" long bolts at a rate of 40 per minute. The largest machine in the group weighs 75 tons.

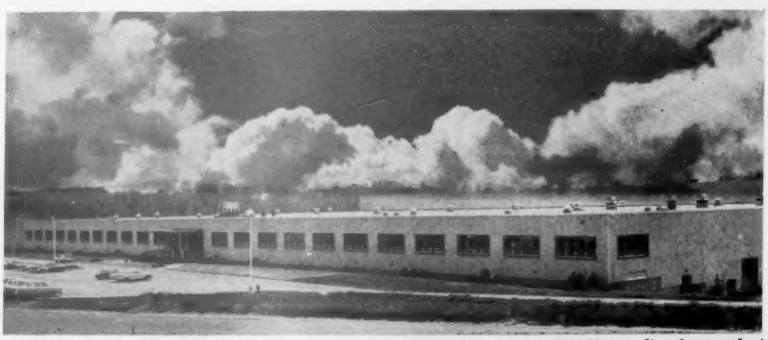


Fig. 3 — Exterior view of WF's new Cheshire plant, which contains 314,000 sq. ft. of manufacturing space.

Switch to Big Payload LPR® Coils

to cut your handling, fabricating and material costs

The LPR® Tag
—badge of wireworking efficiency

LPR BRITE WIRE COILS AT WORK: HERE 3000 LB. COILS OF .105" WIRE GIVE 19 MILES OF NON-STOP FABRICATING

PHOTO: COURTESY G-E DISHWASHER DEPT., LOUISVILLE, KY.

HOW BIG PAYLOAD LPR's SHRINK HANDLING COSTS—Take the receiving operation itself: Users report that LPR's consume half the time required for conventional bundles of equivalent total weight; more LPR wire can be stocked per cubic foot, saving storage space and making it safer, easier to get at and faster to handle . . . housekeeping is improved, inventory control simplified; fewer stock transfers between storage and production departments lighten plant traffic. *LPR's save you time; LPR's save you money.*

HOW DSC LONG PRODUCTION RUN LPR's SLASH FABRICATING COSTS– Users report: Fewer coil changes and setup adjustments reduce downtime, increasing machine-man-hour output; LPR's put new vigor into older machines so they produce more efficiently, let newer, faster equipment perform at peak. *Greater productivity with LPR's means lower operating costs.*

HOW BIG PAYLOAD LPR's REDUCE MATERIAL COSTS—Every time you change a coil you build up remnant scrap and lose precious production time, too. LPR's need fewer coil changes, help you cut down cumulative scrap by as much as 90%, sometimes even more. As your scrap pile goes down your fabricating yield goes up and your unit material costs drop.

These Long Production Run savings are NET TO YOU because you pay nothing extra for LPR advantages.

WIREWORKING SERVICE AT YOUR BECK AND CALL—For case histories documenting LPR performance, helpful wireworking ideas, technical and metallurgical assistance, or wire for trial runs—call your nearest DSC Customer "Rep" or write: DETROIT STEEL CORPORATION, BOX 7508, DETROIT 9, MICH.

Customer Satisfaction—Our No. 1 Job

Customer "REP" Offices in Principal Cities

Steel The Bargain Wonder Metal

Performance Proved

DETROIT STEEL

HR and CR Sheet and Strip • Flat CR Spring Steel
Manufacturers' and HC Specialty Wire
Welded Wire Fabric

Detroit Steel Corporation—General Sales Office, Detroit 9, Michigan
Cable Address DETROSTEEL—New York

COPYRIGHT DETROIT STEEL CORPORATION 1961

Magnesium-Containing Coating Improves Hot-Dip Galvanizing

An improved process for the hot-dip galvanizing of steel has been announced by **The Dow Chemical Company.**

* * *

A six-year evaluation program has indicated that corrosion protection is improved 20 to 90 per cent in industrial-marine atmospheres when a slight amount of magnesium is added to the galvanizing bath.

* * *

The new process resulted from production operations in the Metal Cleaning Department of Dow's Texas Division. Testing has been conducted since 1955 at industrial-marine sites in environments aggressive enough to cause coating failure within six years.

* * *

As the largest consumer of zinc in the United States, hot-dip galvanizing is the most widely used method for protecting steel against corrosion. It is accomplished by various means, including the semi-automatic or hand-dipping of fabricated items, or the mechanical dipping of sheet, wire and pipe. Main divisions of hot-dip galvanizing are: sheet and strip, pipe, wire and wire products, structural steel, metal ware, pole line hardware, range boilers and tanks, malleable steel and gray iron castings.

Automatic Facilities for Sequential Testing of Cables

Special instrument arrays for automated testing of large lots of electrical and electronic components, cable conductors, and insulating materials samples are described in a new bulletin from **Associated Research, Inc.,** 3777 W. Belmont Ave., Chicago 18, Ill.

* * *

Among the many applications for these automatic testers, have been the high voltage breakdown tests made on cables and harnesses utilized in missile control and guidance systems. Automatic recording of test data provides the permanent record required for reliability improvement programs.

* * *

Basic test modules may be combined into completed test arrays for evaluation of many parameters at an unlimited number of test points in a complex system, or for 100% inspection in production lots of 18,000 or more pieces, at one time.

* * *

The Advance Engineering Data Bulletin 8-70.1 that describes these automatic test facilities, may be secured from Associated Research, Inc., 3777 W. Belmont Ave., Chicago 18, Ill.

New Anode For Fluoride-Ion Plating Solutions

Heil Process Equipment Corporation, manufacturers of lined steel and plastic tanks, Nocordal impervious graphite shell and tube and immersion type tank heaters, lined steel and solid

ENGRAVED MARKING WHEELS
and PRINTING MACHINERY

for BETTER printing on
WIRE • HOSE • TUBING
and other EXTRUDED materials

DUNCAN M. GILLIES CO., INC.
66 CENTRAL STREET,
WEST BOYLSTON, MASSACHUSETTS

Telephone:
West Boylston TEmple 5-4445, 5-4444

Made to close tolerances!

Apco Mossberg Reels, Spools and Bobbins are designed and manufactured to precise specifications to assure a true arbor for smooth spool-out at high speeds.

An all steel construction that won't gouge or burr reduces machine down time and maintenance to a minimum.

Apco Mossberg Reels, Spools and Bobbins are designed to give you the exact balance and trueness you need.

For more information, write, wire or call collect.

PACIFIC COAST REPRESENTATIVE:
Gordon Proffitt
World Trade Center
Ferry Building
San Francisco 11, Calif.

CANADIAN REPRESENTATIVE:
Hugh P. Williams & Co.
47 Colbourne Street, West
Toronto, Ontario, Canada

APCO MOSSBERG COMPANY
LAMB STREET, ATTLEBORO, MASSACHUSETTS

plastic ventilating equipment, and a complete line of plating anodes, has just developed and introduced its new HS-32 plating anodes.

* * *

These anodes are manufactured of a new, special lead alloy developed specially for use with high fluoride-ion plating solutions. They have been thoroughly tested in actual operation and have been approved by manufacturers of the fluoride-ion plating solutions for use with them. In addition to other advantages, these anodes have superior current conduction properties after idle or shut-down periods. Available in four round diameter sizes and any desired length. For complete details write Heil Process Equipment Corp., 12850 Elmwood Ave., Cleveland 11, Ohio, for a copy of new Bulletin No. B-4660.

Hex Nut Work-Hardening Overcome

The excellent cold heading properties of Carpenter Stainless No. 10 solved a troublesome hexagonal nut production problem for **Detroit-Diamond Screw Products Co.,** Wyandotte, Mich.

* * *

Stainless wire grades previously used to make the hex nuts were unsatisfactory because these materials work-hardened too rapidly. Thread tapping was difficult and the reject rate was high.

* * *

Detroit-Diamond reports that after Carpenter Stainless No. 10 was specified, production was boosted and the reject rate was lowered considerably. Clean threads were produced easily and consistently, resulting in extended tool life. In addition, use of Carpenter Stainless No. 10 eliminated one annealing process which was required with other stainless grades.

* * *

Carpenter Stainless No. 10 is a modified austenitic, chrome-nickel steel that is particularly useful for cold headed and upset parts because it work hardens much slower than any of the conventional 18-8 analyses steels. It is suitable for use in production of

fasteners, cold heading bolts, screws, and instrument parts and also, for jobs involving severe coining, extrusion and swaging.

Fully Automatic Optical Brightness Pyrometer

Instrument Development Laboratories, Inc., Attleboro, Mass., a subsidiary of Royal McBee Corporation, has introduced the Pyro-650, an optical brightness pyrometer that makes possible continuous recording and controlling of high temperatures in the range from 1200° to over 7000° F.

* * *

Rocket and missile engineers, in particular, have shown keen interest in this instrument for precise temperature measurement of exotic metals and for temperature measurements in physical property studies. Pyro-650 also has many uses in industries such as metals, cement, ceramics, glass, refractory materials, and other industries where operations are carried out at high temperatures. It is of great value in those applications where thermocouples or total radiation pyrometers cannot be used.

* * *

By eliminating the need for manual operation, required by all other optical brightness pyrometers, the Pyro-650 provides more efficient process control and greater repeatability.

* * *

For full information, write for Bulletin No. 361. Instrument Development Laboratories, Inc., 67 Mechanic St., Attleboro, Mass.

New Compact Cable For Missiles and Aircraft

Fred Burns, manager of **Hughes Aircraft Company's** Electromagnetics Dept. at El Segundo, California, has announced a new flat, compact 20-conductor cable having a 36.6% weight-saving ability, with no reduction in current carrying capacity. 1000 feet of conventional cable with 20 conductors of 22 gage wire weighs 82 pounds. The new cable weighs only 52 pounds.

* * *

The flat, flexible cable, supplied with an adhesive strip, will adhere

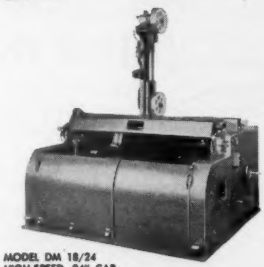
DON'T SACRIFICE QUALITY for CONVENIENCE

Package deals imply certain guarantees and seem initially convenient but your ultimate convenience is best assured when you select an extruder take-up in consideration of its own individual merits.

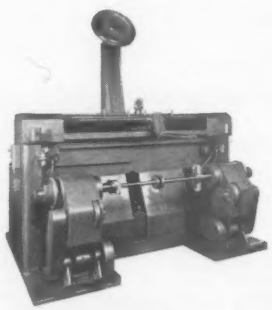
ENTWISTLE Take-Ups are designed and built to stand out in comparisons and performance depends solely on the constant flow of insulated wire from the extrusion system.

No wonder why the discerning Wire and Cable Engineer complements his extruder with a selected ENTWISTLE Take-Up.

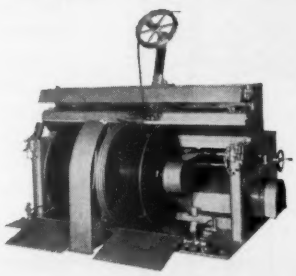
MODEL TE 24/36
STD. DUTY 36" CAP.
SHAFT TYPE



MODEL DM 18/24
HIGH-SPEED, 24" CAP.
SHAFTLESS TYPE



MODEL THE 24/36
HEAVY DUTY, 36" CAP.
SHAFT TYPE



MODEL DM 24/36
HIGH-SPEED, 36" CAP.
SHAFTLESS TYPE

Over 40 years of dependable service

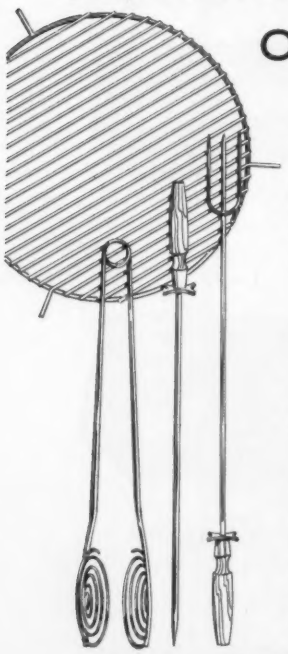
ENTWISTLE Manufacturing Corporation

Formerly James L. Entwistle Co.

1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

United States, Canada	INDUSTRIAL EQUIPMENT CO.	P. O. Box 706, Englewood, N. J.
Europe, So. America, Mexico	FOREL EQUIPMENT CORP.	165 Broadway, N. Y. 6, N. Y.
British Associates	THE KEMSON ENGINEERING CO., LTD.	Blackburn, Lancs., England

Example: FINER "TOOLS" FOR OUTDOOR LIVING



There are no finer grills, implements or "tools" for outdoor living than those made from Continental Wire. There's a temper, gage and finish for almost any product—with smooth clean surface for fast production, and quality to take the forming you require for your product.

Your product may be entirely different—hardware for venetian blinds, or ball bearings, or automotive parts. For a wide variety of applications you can get just the right wire at Continental, in the temper, size, and steel analysis you require.

For your wire requirements in low, medium low, medium high or high carbon steels, round or special shaped, in many different coatings, drop us a line. Our mill technicians have solved hundreds of wire problems, and will be happy to give you the benefit of their experience. Write for free copy of the Continental Wire Manual.

WIRE SPECIALISTS FOR OVER HALF A CENTURY

CONTINENTAL STEEL
CORPORATION · KOKOMO · INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE®, BRYTITE®, FLAME SEALED®, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric. Nails, Continental Chain Link Fence and other products.

tenaciously to the contours of missiles and aircraft with considerable space saving. Other advantages claimed are good heat dissipating properties, better than round cables, and a simplification of wiring. It is said to be good also for a power supply for lighting in trains and busses.

Electric Wire & Cable Section to Meet in Worcester

The Management Committee of the Electric Wire & Cable Section of **The Wire Association** has announced that its next Regional Meeting will be held in the Spring of 1962 at Worcester, Mass., on dates to be announced.

* * *

It is expected that the technical sessions will be in the Sheraton Hotel. Arrangements for a plant inspection tour of the Electrical Cable Works of the American Steel and Wire Division, United States Steel Corporation, have been concluded and work on the program has been started.

New Wire Packaging System

Donald A. Hirst, President of The Hirst Company, Lambertville, N. J., recently developed a system of packaging wire through the use of a new type of holder, in the form of a reel or spool, that has the wire applied thereto in a manner that facilitates the removal of the wire from the holder.

* * *

The invention is especially useful in paying out magnet wire for the manufacture of coils, armatures, solenoids and other electrical equipment. However, it is said to have general application for use with other wires of various sizes and metals.

* * *

This patented packaging equipment is known in this country as the "Hud-Pak", the name given to it by the **Hudson Wire Company,** Ossining, N. Y., who purchased the rights to it. The invention now has been patented in Great Britain and Mr. Hirst has sold the Canadian and British rights to **Canada Wire & Cable Co. Ltd.,** Toronto, Canada.

These two firms hold the licensing rights to the packaging system for the countries named.

Folder on Walco Services to Electrical Industry

Walco Electric Company has issued a folder describing the company's services. This describes, among other things, the Walco Extruder Drives of from 7½ to 200 H.P. in any voltage, and the Walco All-Electric Wire Preheaters for copper and aluminum.

* * *

The Preheater is continuous, heats uniformly, controls temperatures accurately, is non-oxidizing and can be readily synchronized with extrusion equipment. Made in various modes of 220/-440/550 volt, 1 phase, 60 cycle capacity, this portable Preheater will be found to be highly dependable and free from maintenance problems.

* * *

For a copy of this folder, write to Walco Electric Co., 131 Blackstone St., Providence, R. I.

Controlled Convection Wire Enameling Ovens

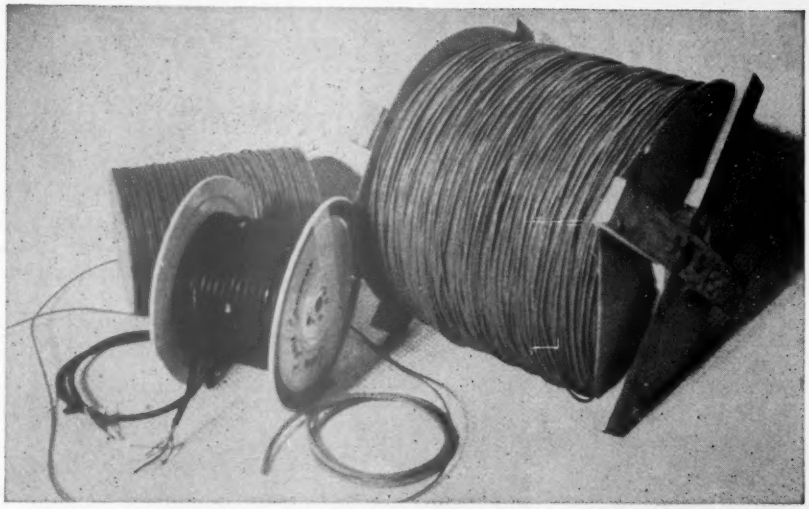
Bulletin GED-4329, four pages, describes General Electric's new controlled convection wire enameling ovens for high-quality magnet wire enameling at twice the speed previously obtainable.

* * *

Drawings show entire equipment including supply stand, pick-up, preannealer and oven. Cutaway drawing of oven with call-outs explains construction features of oven which is designed to apply precisely the right amount of heat and air movement. Also included are a specification chart and picture of the control panel, along with text, explaining how installation, operation and maintenance are simplified. For a copy, write **General Electric Company,** Schenectady 5, N. Y.

Wire Pointing Machines

We are pleased to announce the new Malmedie line of Wire Pointing Machines for threading wire rod into wire drawing dies. The new standard machines Models ASM-I to V have horizontal rol-



For High Tensile Strength, Specify

TEXTILENE GLASCOR*

Soft, dry fillers for portable and flexible cords, Textilene Glascor and Twi-Port have wide acceptance. Fiberglas-centered Glascor is exceptionally strong without added bulk or sacrifice of pliability. It goes into S, SJ, and SV cords with 18, 16, and 14 gauge conductors — Twi-Port into S and SJ cords with 12 gauge and larger conductors. Successful applications include control, appliance, and power cables; telephone drop wire; communications and coaxial cables.

Twitchell's superior Textilene line also includes: Fungus-resistant filler — *Twi-Tar.* Used for buried communications cable, expanded ACSR cable, and in other applications.

Moisture-resistant fillers—*Twi-Flex* and *Twi-Wax.* Used for nonmetallic sheathed cable, maritime shipboard cable, varnished cambric cable.

*Patent No. 2832190

For Every Wire and Cable Application
Twitchell's TEXTILENE Fillers Fill The Bill

Quality-controlled materials that are dependably uniform . . . in standard forms, or customized to special needs.

Assured supply from a reliable domestic source . . . always available in economical and convenient packaging.

Initial low cost with savings added by production efficiency . . . flexible, ready-to-use fillers that fit all equipment, handle and form easily, always maintain desired shape.

Proved performance as components of cables and wires that meet government specifications . . . stability shown by trouble-free installations in continuous service 20 years and longer.

FREE — SAMPLE SPOOLS of any type of Textilene filler to demonstrate the superiority of Twitchell materials in your operation—also technical counsel without cost or obligation. Just tell Twitchell your end-use requirements. *Write, wire, or phone today:*

E.W. TWITCHELL INC.

Third and Somerset Streets, Philadelphia 33, Pa. • REgent 9-7800

PAPER PRODUCTS FOR THE WIRE INDUSTRY

Twisted • Folded • Pressed • Crushed • Shaped • Braided • Woven

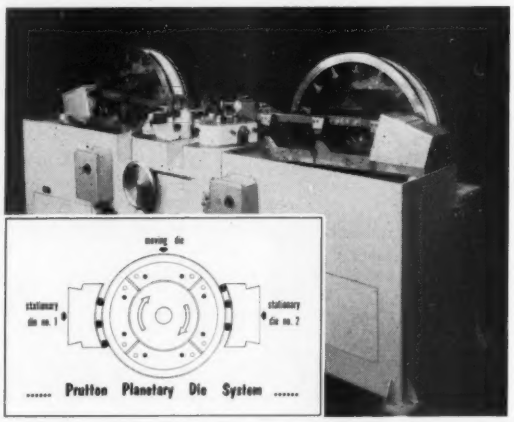
Rolls 108,000 Nails Per Hour!

Now Possible with the NEW PRUTTON AIR-JET FEED*

An Air-Jet Feed Attachment used in place of regular Prutton feed fingers and related timing components for feeding annular ring nails not exceeding 1-1/2" in length.

Designed exclusively for threading nails this Prutton Rollmaster 125B-HV can hammer up nail production

500%



PRUTTON'S PLANETARY CIRCULAR DIE accounts for the tremendous increased production speed. Patented horizontal vibratory feed tracks feed nails to each side of the die in a continuous stream. The "lost motion" of the reciprocal type thread roller is completely eliminated.

Screw shank nails and all screw forms, however, require proper timing — a Prutton rolls nails over 1½" in length at 600 to 800 pieces per minute. Therefore, there is no contest between a Prutton and ordinary thread rolling machines producing a mere 150 pieces per minute.

In addition to speed advantages the Prutton Model 125B-HV permits the operator to have complete access to the entire feed track and the inside of the hopper at all times. Total hopper capacity up to 150 lbs. Odd sizes and "bad blanks" can be quickly and easily removed without stopping the machine. There is absolutely no nail spillage. Working at this machine is like working at a bench. Loading height is a mere 36 inches.

HIGHER OUTPUT AND LOWER COSTS ADD DOLLARS TO YOUR THREAD ROLLING PROFITS . . .

A Prutton can be used for thread rolling, roll forming, knurling, marking, serrating and necking of nails, bolts, screws and special parts in a wide range of sizes. Send prints and/or samples for free estimates on machine costs.

Write or Phone for Cost Saving Information TODAY!

PRUTTON PLANETARY THREAD ROLLERS

PRUTTON CORPORATION

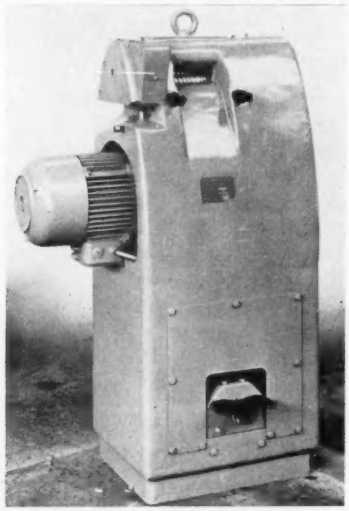
Leader in Planetary Thread Rolling Machines

5305 WEST 130th STREET CLEVELAND 30, OHIO

lers and a cutter for cutting wire ends.

* * *

The larger machines Type III-V can be supplied with horizontal and vertical roller sets. The double roller facilitates reducing heavy rods, making it unnecessary to turn the wire through 90



Malmedie Rod Pointer

degrees, as on machines with only one set of rollers.

* * *

The motor is fitted into the machine and has a pedal control. The hardened rollers are spur gear driven with accurate calibrations geometrically stepped to obtain uniform results. The new pointing principle guarantees maximum safety against accidents.

* * *

Further information will be supplied by Straus-Artys Corp., 45 No. Station Plaza, Great Neck, N. Y.

Announces New Insulation Materials

A new high temperature electrical insulation system, based on a polymer experimentally known as Polymer ML, is being developed by the **Du Pont Company's Fabrics and Finishes Department.** It offers a unique combination of properties aimed at solution of insulation problems throughout the electrical industry.

* * *

The family of materials, pro-

viding a completely homogeneous insulation system, includes wire enamels, coated fabric space insulations, and insulating varnishes. **Du Pont's** industrial finishes section has enumerated seven significant properties already indicated by laboratory and field tests with the materials.

1. **Excellent thermal stability, with an expected life of more than 10 years at 200 degrees C., more than two years at 250 degrees C., several months at 300 degrees C., and at 400 to 500 degrees C. for shorter periods.**
2. **Electrical properties excellent, remaining essentially unchanged from room temperature to over 250 degrees C.**
3. **Solvent resistance outstanding; there is no known solvent for cured Polymer ML.**
4. **Wire enamel will not "cut through" at 500 degrees C. when subjected to standard cut-through tests.**
5. **Radiation resistance excellent. There was little change in the materials during radiation with 3,000 megarads of 2 mev electrons.**
6. **Moisture resistance excellent. Electric strength exceeds 2,000 volts per mil when the materials are wet, and insulation resistance is more than 500,000 megohms after boiling in water for 10 minutes.**
7. **Cured insulation will not support combustion.**

Superiority of the new insulation system has been confirmed repeatedly by accelerated laboratory tests and by actual service of electric equipment, involving severe applications where frequent failures occurred previously. In test motors run at 250 degrees C., the insulation has outlasted several sets of bearings.

* * *

The wire enamel is available in production quantities from pilot plant equipment to all interested wire manufacturers for experimental and commercial use, and information on Polymer ML insulated wire can be obtained from magnet wire producers. The insulating varnish is in similar supply. A four-mil coated fabric is expected to be available soon, and development work is under way on other thicknesses.

* * *

Larger scale commercial production of these materials will be considered as further field experience continues to demonstrate their superiority for use by the electrical industry.

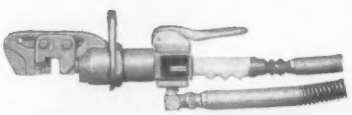
NEW DESIGN

MANCO Hydraulic Guillotine®

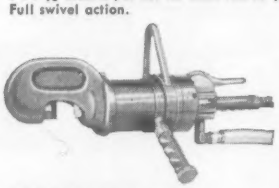
WIRE AND ROD CUTTERS

Big Capacity

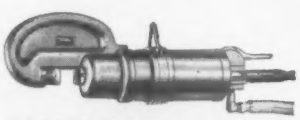
FAST · EASY TO USE



MODEL MC 210 Capacity ½" High speed . . . ½ second per cut for steel rod to ½". Full swivel action.



MODEL MC 35 Capacity 1" Cuts high carbon material including reinforcing rod and heat treated chain to 1" diameter in 1¼ seconds per cut.



MODEL MC 65 Capacity 1¼" Cuts 1¼" diameter steel in 2 seconds per cut. Can be modified to cut 1⅝" diameter aluminum.

Big Time and Money Saver for Rod Mills and Users of Wire and Rod

Ideal for production cutting, trimming off cobbled ends, taking test samples and splitting bundles on docks.

Manco has completely redesigned the Guillotine line of wire and rod cutters now used by major rod mills throughout the world. These new Manco Guillotine units give high efficiency, heavy duty performance, with a 75% slash in tool maintenance costs.

New Interchangeable Blade and Anvil

Interchangeable blade and anvil means wear points can be reversed for virtually double life. Three blade styles for various cutting requirements. There is a new simplified valve design with hardened and ground parts for longer life. Also, new Meehanite piston with large bearing surface and a new piston seal assembly that permits quick replacement.

These Guillotine units powered by Manco Hi-Thrust Electric Hydraulic Pumps

Write for Complete Information W-7

WRITE FOR CATALOG

MANCO MFG. CO., Bradley, Illinois

Please send:

☐ Catalog of new Guillotine Wire and Rod Cutters.

Name .....

Firm .....

City ..... Zone..... State.....

Outstanding Personalities of the Wire Industry

A S & W Announces R & D Appointments

Creation in **American Steel and Wire** of a combined engineering, research and product development department to assist in winning new markets for existing and improved products and to accelerate development of new products has been announced by **Van H. Leichliter,** president of this U. S. Steel Division.

* * *

Walter L. Longnecker, former Cleveland District manager of operations, was appointed director, engineering and research, and will head the new department.

* * *

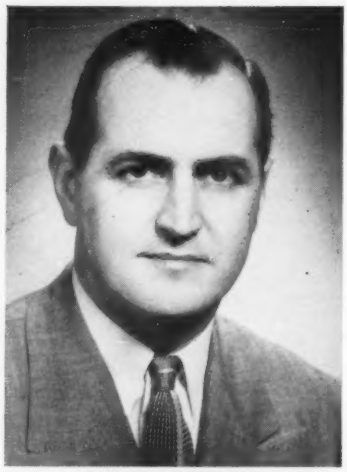
In the new department, **Floyd A. Garman** will continue to supervise engineering activities as chief engineer.

* * *

Dr. Raymond B. Hoxeng has been named director of research. He had been assistant to director at U. S. Steel's applied research laboratory at Monroeville, Pa.

* * *

Walter O. Everling, who has been director of research, becomes research consultant, and will assist in coordinating the activities of the three branches.



Walter L. Longnecker

* * *

Ronald E. Griffiths, who has been assistant director of research, was named to direct product development.

* * *

Mr. Longnecker graduated from Worcester Polytechnic Institute with a degree in mechanical engineering. Joining American Steel and Wire in 1939 as a technical apprentice at the Donora (Pa.) Works, he had become general foreman in the rod mills at the plant at the time of his transfer to the Cleveland headquarters office in 1945 as division metallurgist, rod mills. The following year, he became division superintendent of hot mills at the Cuyahoga Works in Cleveland, and in 1951 was named general superintendent of Cuyahoga Works. Since

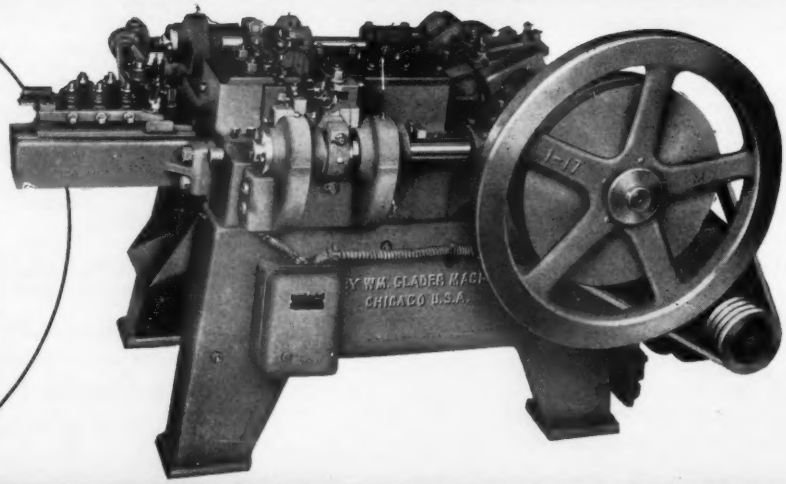
GLADER

HIGH SPEED WIRE NAIL MACHINES

HIGH TONNAGE OUTPUT—LOW MAINTENANCE COST

You can take care of increased production schedules and better product demands with these machines of established reputation.

For 55 years GLADER MACHINES have been giving HIGH QUALITY, LOW COST nail production.



Wm. Glader Machine Works 210 N. Racine Avenue Chicago 7, Illinois

Export Dept. 122 East 42nd Street -:- New York 17, N. Y.

1956, he has been Cleveland District manager of operations, the position he leaves to accept his new assignment.

Made Director of Sales by Monsanto

The appointment of **Richard T. Clark** to the position of director of sales, vinyl products, has been announced by **C. L. Jones,** assistant director of marketing for **Monsanto Chemical Company's** Plastics Division.

* * *

Mr. Clark will be responsible for sales of the company's Opalon vinyl chloride resins and compounds and Ultron vinyl film and sheeting. He joined Monsanto in 1939, after receiving his AB degree in business administration from Tuck School of Business Administration at Dartmouth College. He was appointed product administrator for vinyls in 1959, after serving as director of sales, raw materials, for the Plastics Division.

Changes at Waterbury-Farrel

Concurrent with the moving of the plant and offices of **The Waterbury-Farrel Foundry & Machine Company,** Division of Textron, Inc., from Waterbury to Cheshire, Conn., a number of assignments have been altered.

* * *

R. E. Walsh has been made manager of the Power Press Sales Division, **K. R. Betts, Jr.** has been named Sales Application Engineer in charge of the Wire Machinery Division, and **G. A. Backman** is Manager of the Rolling Mill Sales Division.

Hudson Wire Appoints Plant Manager of Ossining Division

James V. DeMattei has been appointed Plant Manager for the Ossining Division, **Hudson Wire Company,** Ossining, New York. He will continue to direct all purchasing activities for the Division.

* * *

Formerly, Mr. DeMattei had been Division Manager of Materials. Prior to joining Hudson, he was Factory Manager of Atlas Sound Corp., and Chief Industrial Engineer with Hatfield Wire Co. He attended the University of Tennessee, Pratt Institute, and did graduate work in industrial engineering at New York University.

Kenrich Elects New President

The Board of Directors of **Kenrich Petrochemicals, Inc.,** has announced that **Hermann Rogge** has been elected president and that **Oscar A. Spiegelhalder** has been elected to head **Kenrich International,** the company's international sales division. Mr. Spiegelhalder also will head the Board's Executive Committee, on which he will serve with Mr. Rogge and the Board's Chairman, **Martin Wright.**

* * *

Mr. Rogge previously had served the company in a consulting capacity and is a member of

Marking Machines, Wheels & Inks

FOR INSULATED WIRE, TUBING AND PIPE—

Type AM — Illustrated has these features:

1. FINE VERTICAL AND HORIZONTAL ADJUSTMENTS PROVIDE PERFECT MARKING ON WIRES OF .010" TO 3.00" IN DIAMETER.
2. ACCOMMODATES FLAT, CONCAVE, OR SPECIAL WHEELS.
3. CAN BE DRIVEN BY ELECTRIC MOTOR OR SELSYN TRANSMITTER AND RECEIVER TO INSURE PERFECT PRINTING WITH MINIMUM PRESSURE.

Actual Production Photo of Type AM

Horizontal Adjustment

GEM GRAVURE CO., INC.
West Hanover, Massachusetts, U. S. A.
CABLE ADDRESS: GEMGRA
Telephone: ROCKLAND TRiangle 8-0456

IN THE MARKING OF EXTRUDED MATERIAL THERE ARE BIG ADVANTAGES IN ONE SINGLE SOURCE OF SUPPLY.
KNOW-HOW • INKS • WHEELS • MACHINES

West Coast Representative: Paul I. Kenner Co., 230 Shaw Rd., So. San Francisco, Calif.
West Germany: Walter G. Fritzke GMBH, AM Wehrhahn 94-96, Dusseldorf, W. Germany
Warbrick Engineering Specialties Limited, Barclays Bank Chambers, Sanky Street, Warrington, England.

its Board of Directors and those of its subsidiaries, **Laribee Wire Inc.**, and **Southwest Metal Industries.**

* * *

Mr. Rogge, a graduate of Harvard College and the Columbia University School of Law, is a partner in the law firm of Rogge, Wright and Rogge.

Named Works Manager by C F & I

C. Clay Crawford has been appointed works manager of **The Colorado Fuel & Iron Corporation's** Pueblo Plant, it was announced by **Jay J. Martin,** vice president in charge of operations for the Western Division.

* * *

Mr. Crawford has been serving as superintendent of the seamless tube mill since 1956. Prior to this, he served as assistant superintendent of the seamless tube mill and in the quality control department. He joined CF&I in 1946 in the mining department at the Pueblo Plant. He is a graduate of the Colorado School of Mines with a degree in metallurgical engineering.

Research Engineer Promoted by U. S. Rubber

William E. Wolstenholme has been appointed a senior research scientist at the Research Center of **United States Rubber Co.** at Wayne, N. J., it was announced by **Dr. L. M. White,** director of research and development for the company.

* * *

Mr. Wolstenholme, a member of the plastics research department, is engaged in problems relating the physical properties of polymers to molecular structure. He has published five technical papers on high polymer physics and has done research in a broad field, including rheology, hysteresis, dilatometry, stress relaxation and transitions of high polymers.

* * *

A graduate of New York University, Mr. Wolstenholme also has a master's degree in mathematics from NYU. He joined U. S. Rubber in 1932.

Du Pont Appointments

Jerome J. Hargarten has been appointed an assistant director of sales for the **Du Pont Electrochemicals Department,** succeeding **Thomas J. Milligan,** whose transfer to Geneva, Switzerland, as managing director of Du Pont de Nemours International S. A. was announced recently. **G. L. Parmentier,** Cincinnati district office manager, will replace Mr. Hargarten as manager of the Chlorine Products Division of the Electrochemicals Department.

* * *

Mr. Hargarten joined Du Pont as an engineer in 1950, following his graduation from Cornell University, where he received a Bachelor of Chemical Engineering degree.

* * *

Mr. Parmentier joined Du Pont's

The Difference
IS HERE.....
NEW MPS CONVOLUTE DURA CURL RIMS...
The difference between just any spool or reel and Superior MPS CONVOLUTE DURA CURL Rims is well worth your close attention. Because now, with this exclusive MPS feature, maximum strength and rigidity are obtained throughout the reel heads. You can now have continuous trouble free high speed winding, without spool straightening expense. These new MPS spools also have the famous No-Crev feature.
Ask about MPS CONVOLUTE DURA CURL RIMS today. We invite your inquiries.
MPS
CONVOLUTE
Dura Curl
Spools & Reels
give you brute strength with dimensional precision, concentricity, and balance. Another patented MPS development engineered to help you!
18 West St., Attleboro,
Massachusetts, U.S.A.
Telephone CAstle 2-0847
Mossberg PRESSED STEEL Corporation
DIVISION OF WANSKUCK CO.
#110

engineering staff in 1942, after graduating from Princeton University with a Bachelor of Science degree in engineering.

Riverside-Alloy Opens Western Office

A new West Coast district office has been opened by **Riverside-Alloy Metal Div.**, H. K. Porter Co., Inc. **William J. Reed**, with more than 20 years experience, was named to head the new office.

* * *

His territory includes California, Oregon and Washington, with offices at the Porter products distribution center at 6900 East Elm St., Los Angeles.

* * *

Mr. Reed combines several years of mill experience with his more recent sales background. He first joined the Alloy Works in 1939 as a wire drawer in the fine wire department. Later, when he returned to Alloy after serving in World War II, he became Night Superintendent. In this position, he was in charge of the entire plant.

* * *

He was transferred to the sales department in 1952 and worked with the inside sales staff for one year, then took over the Philadelphia territory as district manager. In 1956, he became district manager in Cleveland. Two years later, Mr. Reed was recalled to the Division general office and was named Alloy Product Sales Manager, the position he held prior to his latest appointment.

Carpenter Steel Appoints Mendes

Anthony A. Mendes has been appointed branch manager for the North Jersey district of **The Carpenter Steel Co.**, Reading, Pa.

* * *

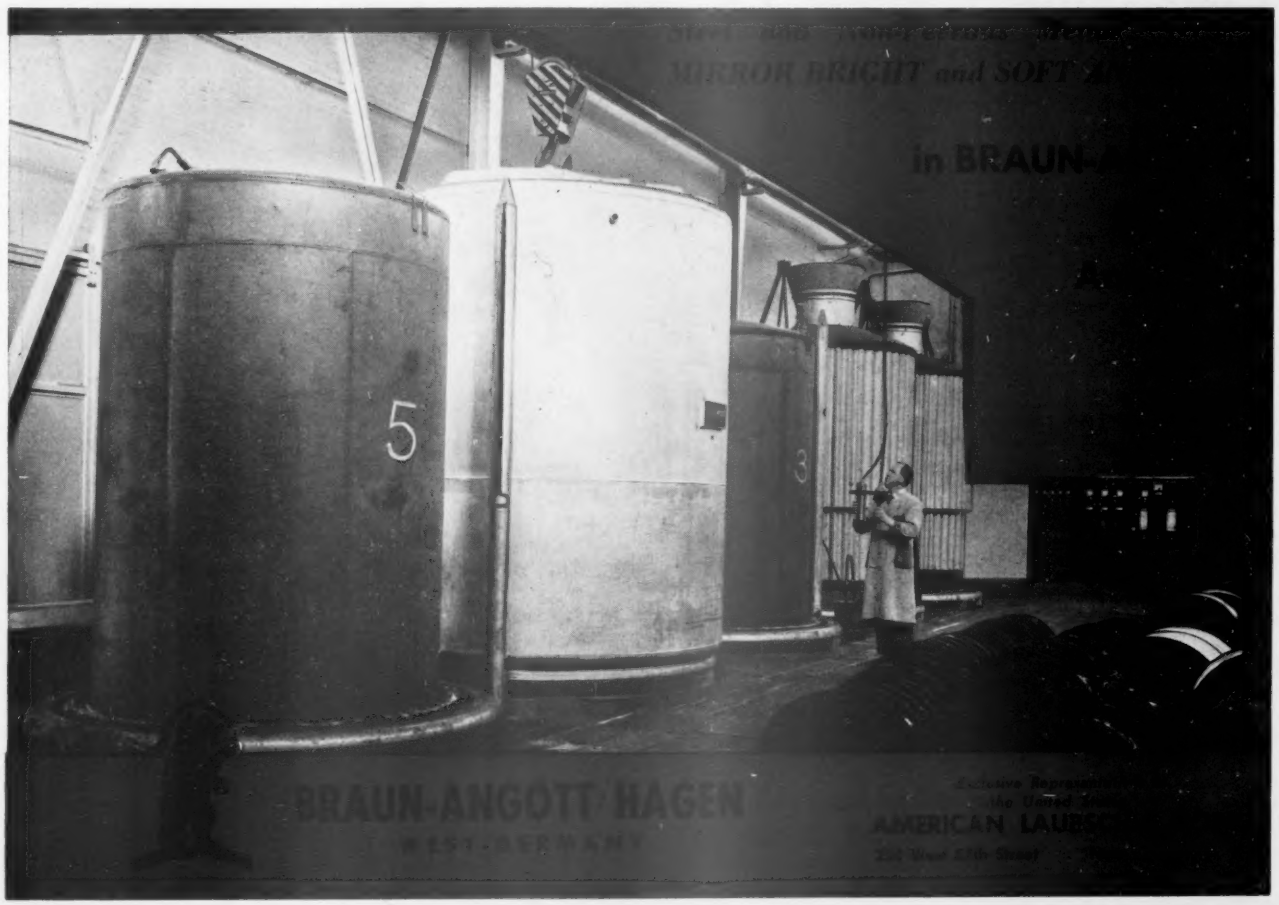
Mr. Mendes will be responsible for specialty steel sales directing operations from Carpenter's warehouse at Mountainside, N. J. He has been associated with Carpenter as a sales representative since 1953. His education includes studies at Brooklyn Polytechnic Institute and tool-making courses at Picatinny Arsenal, Dover, N. J.

Youngstown Expands Research Department

A large and rapid expansion of **The Youngstown Sheet and Tube Company's** research and development staff has been announced by **Dr. Karl L. Fetters**, vice president — research and development.

* * *

Accompanying the staff expansion, which includes seven research specialists who have recently joined the company, is a department reorganization that puts two men into new supervi-



sory positions, and forms special study sections in raw materials, physical metallurgy, and iron and steelmaking practices.

* * *

Product research work is conducted at the Buckeye laboratory, near the Campbell Works, and process research is carried on largely in various locations in the mills.

* * *

Those named to newly created positions are **Robert H. Frazier,** named manager of applied research, and **Joseph W. Lodge,** appointed acting supervisor — new product development.

* * *

Joining the staff as supervisor of raw materials research is **Dr. Melvin C. Chang,** whose special field is extractive and chemical metallurgy.

* * *

Dr. Royston P. Morgan has been named supervisor of physical metallurgy. In this position he will be in charge of the Buckeye laboratories and all laboratory investigations involving product improvement and new product development.

* * *

Dr. Johannes M. Uys has been appointed supervisor of iron and steel making. His special field involves the improvement of blast furnace and open hearth practices, and investigative work on solidification and conversion of steel products.

* * *

Named assistant supervisor of raw material research is **George H. Denton.** An expert geologist, he is in charge of carbonization studies, directs operation of the company's pilot coke oven and heads a newly organized anthracology laboratory.

* * *

James L. Bayer has joined the staff as a research engineer in mineral petrography. Also a geologist, he is working in the carbonization section which aims at better utilization of coking coals.

* * *

William R. Patterson is engaged as a research engineer in product research, with special work on Youngstown's high strength low alloy steel marketed under the Yoloy tradename.

* * *

Henry J. Oberson is engaged as a research engineer, assigned to special duties in the raw materials section under Dr. Chang.

Wire Cloth Firm Enlarges Representative's Territory

Newark Wire Cloth Company, 351 Verona Ave., Newark 4, N. J., manufacturer of wire cloth and allied products announces that the States of Maryland and Delaware have been added to the territory covered by its representative, **W. E. Green,** 21 Circle Road, Levittown, Pa.

With **COOK'S** *improved, high speed*
HOT-DIP TANK TINNER

you can enjoy production up to
20,000 FEET A MINUTE!*

Yes, here is America's most advanced-design tinning installation. Fully complete because it includes a supply stand, flux pot with dip rods and wipes, tinning tank with burner and automatic temperature control units, water cooling tank with recirculating pump and high-speed take-up that maintains constant linear speed. Remember, every part of this machine can be built to suit your own particular individual needs.

* Using 20 lines of fine wire

Check these
FEATURES

- Very flexible in its design
- Gives wire perfect uniformity
- Uses improved wiping method and dip rod construction
- Cannot produce rough wire
- Built of rugged, all welded parts
- Takes 12 to 20 lines or spools
- Up to 1000 ft. per minute speed
- Low initial investment

COOK Manufacturing COMPANY

50 EAST 25th ST., PATERSON 4, N. J. — ARmory 4-6380
Wire and cable processing and fabricating machines

To Direct Communications Wire Sales for Anaconda

Robert E. McIlvane has been named Manager - Communications Products Division, of the **Anaconda Wire & Cable Co.** In this capacity, Mr. McIlvane will have full responsibility for marketing the company's full line of communications wire and cable. In addition, he will direct the sale of communications products in the field and establish sales policies on these products.

Heads Scovill's Divisional Operations

Norman H. Schlink has been appointed vice president in charge of divisional operations in the United States by **Scovill Mfg. Co.**, Waterbury, Conn. He joined Scovill in 1948 and has served as a plant engineer, chief engineer, administrative vice president, general manager of the General Manufacturing Division, and vice president in charge of Waterbury Fabricating Divisions.

Wire Buyers Elect Officers

J. R. Garey, William Brand-Rex Division, American Enka Corp., Concord, Mass., was elected chairman of the Buyers Group, Insulators of Electrical Conductors, National Ass'n of Purchasing Agents, at a recent meeting.

* * *

Other officers elected to serve in the coming year were: secretary, **T. B. Woodcock,** The Okonite Co., subsidiary of Kennecott Copper Corp., Passaic, N. J., and treasurer, **Raymond Miniter,** Rockbestos Wire & Cable Co., division of Cerro Corp., New Haven, Conn. Appointed to the executive committee were: **E. R. Johnson,** American Steel & Wire Division, U. S. Steel Corp., Worcester, Mass.; **Walter Rausch,** Acme Wire Co., Hamden, Conn., and **R. C. Genereux,** Ansonia Wire & Cable Co., Ashton, R. I.

Beryllium Corp. Names Development Engineer

The Beryllium Corporation, Reading, Pa., has announced the appointment of **Philip S. Hanson** as Product Development Engineer.

Assumes Charge of Wire and Cable Firm

Shannon C. Powers was elected vice president and general manager of the **National Electric Division** of the H. K. Porter Co. Mr. Powers, 41, has been general manager of National Electric Division since December, 1960, and prior to that was general manager of Peerless Electric Division of Porter at Warren, Ohio.

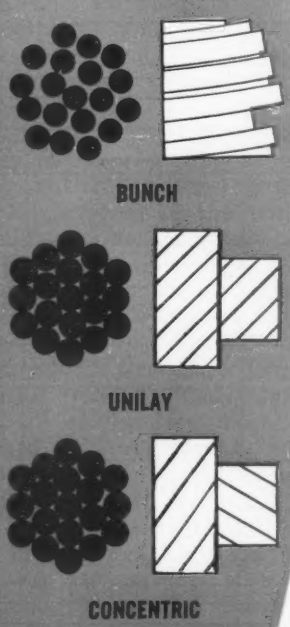
Allied Research Appoints Ostrander

It has been announced by **H. C. Irvin,** President, **Allied Research Products, Inc.,** Baltimore, that **Charles W. Ostrander** has been appointed to the post of Technical Assistant to the President.

* * *

Mr. Ostrander has been associated with Allied since its inception in 1941, and his most recent posi-

Which Wire Construction is Best . . .



Hudson makes all three in bare and plated constructions. Each is best suited for particular applications and insulating materials. For many years, the industry "standards" were bunch and concentric strandings. But with Hudson's marketing of unilay, there has been a strong swing to this versatile construction.

. . . for your Application

BUNCH constructions are generally used for flexible cords and fixture wires complying with UL standards, ASTM, and all military specs where permitted.

UNILAY constructions should be utilized where concentricity is a major requirement, or for economic reasons to get more for your insulating dollar. Since unilay constructions are preformed and twisted in the same direction, they are uniform and smaller in O.D. than bunched or concentric constructions. Unilay constructions are suited for all bunched applications, and are being substituted for concentrics in many applications with comparable performance at considerably lower conductor cost.

CONCENTRIC Where concentric strand conductors are required by customer or military spec, Hudson's concentric wires will meet the most exacting requirements.

For additional information on stranded and single-end conductors — bare and plated — write to:

HUDSON WIRE COMPANY
OSSINING DIVISION, OSSINING, NEW YORK / TELEPHONE: WILSON 1-8500

tion prior to his promotion was Technical Director. He has been given the special assignment of investigating the sales and technical problems associated with a new line of metal finishing products being developed. He will also continue to be primarily responsible for patent work, foreign liaison, and technical liaison between the Sales Department and the Product Development Group.

Assigned to Electric Wire Sales by Reynolds Metals

Roy H. Hainsworth has been named assistant to the director of electrical market sales by **Reynolds Metals Company**, Richmond, Va.

* * *

Mr. Hainsworth will be responsible for coordinating Reynolds market activities for all insulated wire and cable products. He formerly was product sales manager for **John A. Roebling's Sons Division**, Colorado Fuel & Iron Corporation, Trenton, N. J. He has been associated with the electrical industry for the past 15 years.

Sunbeam Appoints Representatives

Sunbeam Equipment Corporation, Meadville, Pa., has appointed Haylett O'Neill & Son, 2505 Travis Street, Houston, Texas, to represent the Sunbeam line of industrial heat treating furnace equipment in Texas and western Louisiana.

* * *

At the same time the company announced the appointment of **A. C. Cavedo**, 35 Malvern Ave., Richmond 21, Virginia, to sell the Sunbeam line in the State of Virginia.

WRI Names Structural Engineer

Charles P. Weisz has been appointed Structural Engineer for the **Wire Reinforcement Institute** according to **Frank B. Brown**, Managing Director of the Washington, D. C. association of welded wire fabric manufacturers.

* * *

Mr. Weisz, who assumed his new duties in May with WRI, has been in charge of plan preparation for Hazelet & Erdal, Cincinnati, Ohio, consulting engineers for the past 9 years. There he supervised design for bridges, highways, sewers, railroads, industrial buildings, and other major projects. He is a University of Colorado graduate.

* * *

Mr. Weisz' new post has been created in answer to rising interest among engineers and consultants in design for and use of **heavy** welded wire fabric in major building projects. Within recent years, the wire reinforcement industry has achieved the ability to manufacture large sheets of welded fabric with cross members as heavy as ½ inch diameter in each direction. Use of these large area sheets, providing **two-way** reinforcement, offers time saving advantages in handling and placement. His services will be available to designers, engineers, and consultants in the U. S. and Canada for assistance on designs using welded wire fabric.

THE 1961 BUYERS' GUIDE
Have you ordered your copy?
Price: $5.00

AMERICAN IRON AND STEEL INSTITUTE
150 EAST FORTY-SECOND STREET, NEW YORK 17, N. Y.

AIS 10

SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS
(NET TONS)

APRIL - 1961
Month

Covering Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or for Resale)

STEEL PRODUCTS	Line	CURRENT MONTH 1961 CARBON	ALLOY	STAINLESS	TOTAL	Percent of Total Shipments	Prior Year (1960) Percent of Total Shipments	YEAR TO DATE * 1961 CARBON	ALLOY	STAINLESS	TOTAL	Percent of Total Shipments	Prior Year (1960) Percent of Total Shipments
Ingots and steel castings	1A	9,138	5,606	449	15,193	0.4	0.4	34,444	35,303	1,171	70,918	0.4	0.5
Blooms, slabs, billets, sheet bars	1B	49,770	27,302	2,442	79,574	1.5	1.6	203,052	100,574	10,161	313,787	1.7	2.3
Tube rounds	1C	578	367	27	1,272	-	-	2,318	2,557	27	4,902	-	-
Skelp	2	2,623	-	-	2,623	0.1	0.1	46,144	-	-	46,144	0.2	0.2
Wire rods	3	66,901	1,418	765	69,084	1.3	1.2	252,819	5,778	3,378	261,975	1.4	1.5
Total Semi-Finished		129,310	37,753	3,683	170,746	3.3	3.3	538,777	144,212	14,737	697,726	3.7	4.5
Total Rails and Accessories		21,481	1,247	-	82,728	1.6	2.2	282,334	6,397	-	288,731	1.5	2.0
Bars-Hot rolled(incl. light shapes)	14	368,918	97,243	3,454	469,615	9.2	10.1	1,401,235	367,389	13,000	1,781,624	9.4	10.7
Bars-Reinforcing	15	236,587	-	-	236,587	4.6	2.4	707,651	208	-	707,859	3.7	2.1
Bars-Cold finished	16	70,854	12,668	4,526	88,048	1.7	2.1	275,003	48,991	17,397	341,391	1.6	2.1
Tool steel	17	427	5,490	-	5,987	0.1	0.1	2,199	22,216	-	24,415	0.1	0.1
Total Bars and Tool Steel		676,856	115,401	7,980	800,237	15.6	14.7	2,386,088	438,804	30,397	2,855,289	15.0	15.0
Total Pipe and Tubing		523,633	39,697	2,036	565,566	11.0	9.1	1,869,251	148,606	7,330	2,025,227	10.6	9.7
Wire-Drawn	23	194,354	2,711	1,847	198,912	3.9	3.0	650,023	9,966	6,953	666,942	3.5	3.2
Wire-Nails and staples	24	31,636	-	1	31,637	0.6	0.3	107,343	-	2	107,345	0.6	0.4
Wire-Barbed and twisted	25	9,452	-	-	9,452	0.2	0.1	27,873	-	1	27,874	0.1	0.1
Wire-Woven wire fence	26	17,284	-	-	17,284	0.3	0.2	52,432	-	-	52,432	0.3	0.1
Wire-Bale ties and baling wire	27	8,717	-	-	8,717	0.2	0.1	18,022	-	-	18,022	0.1	0.1
Total Wire and Wire Products		261,443	2,711	1,848	266,002	5.2	3.7	885,693	9,966	6,956	902,615	4.7	3.9
Sheets-Hot rolled	31	506,447	12,190	1,267	519,904	10.1	11.8	1,887,141	50,840	5,082	1,943,063	10.2	11.9
Sheets-Cold rolled	32	871,166	3,169	10,832	885,167	17.3	20.5	3,286,360	11,175	45,964	3,343,499	17.5	19.6
Sheets-Galvanized	33	257,673	44	-	257,717	5.0	4.4	903,991	128	-	904,119	4.8	4.0
Sheets-All other metallic coated	34	15,173	-	-	15,173	0.3	0.4	62,263	-	-	62,263	0.3	0.4
Electrical sheets and strip	35	1,496	40,504	-	42,000	0.8	0.7	5,513	161,625	-	167,138	0.9	0.8
Strip-Hot rolled	36	79,306	1,203	263	80,772	1.6	2.0	311,930	4,872	2,433	318,235	1.7	2.0
Strip-Cold rolled	37	73,858	1,223	12,962	88,043	1.7	1.8	298,999	4,664	47,283	350,936	1.8	2.0
Total Sheets and Strip		1,805,119	58,333	25,324	1,888,776	36.8	41.6	6,756,197	233,294	99,762	7,089,253	37.2	40.7
Total Shipments (1961)		4,800,464	288,776	44,230	5,133,470	100.0	xxx	17,742,012	1,146,927	171,422	19,060,361	100.0	xxx
Total-Prior Year (1960)		6,302,126	394,255	45,428	6,741,809	xxx	100.0	28,372,689	2,086,089	238,411	30,697,189	xxx	100.0

* Revised

6261

C F & I Appoints P. A.

Fordyce Coburn has been appointed director of purchases for The Colorado Fuel and Iron Corporation, it was announced by **A. F. Franz,** president.

* * *

Mr. Coburn joined CF&I in 1951 as district Manager of the Birdsboro, Pennsylvania and Wharton, New Jersey operations. Prior to this, he had been associated with International Harvester and Brooke Iron Company. He graduated from the Massachusetts Institute of Technology in 1927 with a Bachelor of Science degree.

New Roebling Offices

The New York and Philadelphia offices of **John A. Roebling's Sons Division,** The Colorado Fuel and Iron Corp., were moved into a new office and warehouse at Adams Station, New Jersey, on June 1, according to an announcement by **E. G. Hartmann,** Vice President - Sales.

* * *

The new structure is located at U. S. Route No. 1 and Adams Lane, just five miles south of the New Brunswick traffic circle. It will be occupied by **John P. Kadlic** and **Charles A. Wagner,** wire rope sales managers for the New York and Philadelphia districts, respectively, and by **Irving S. Yates,** wire and cold rolled steel products sales manager for the New York district. A full complement of office and warehouse personnel, representing wire rope and cold rolled steel products will be involved in the transfer. It will also be the home office for the following wire rope sales representatives: **Clyde C. Bergen** (assistant sales manager, New York district), **Paul W. Dolan, Raymond C. Graham, John W. Knierim, John E. Lenz, John J. Sisk,** all of the New York area. **Richard C. Gore, Paul L. James, Michael E. Petro, Clarence R. Snedeker, Robert H. Steel,** from the Philadelphia territory. From this new, central location these men will be serving wire rope customers in the New York area, Philadelphia area, New England states, Maryland, Virginia and the District of Columbia.

* * *

Sales representatives for wire and cold rolled steel products division in the new quarters will be **William J. Crawford, Stanley B. Johnson, Harold A. Knierim** and **Richard A. Mount.** These men will be serving customers in New York, Connecticut and northern New Jersey.

KRUPP

Aluminum or lead-sheathing press

our manufacturing program includes:

HYDRAULIC PRESSES FOR THE CABLE INDUSTRY:

Cable sheathing presses for lead and aluminum. Special presses for lead and tin. Other hydraulic equipment for straightening and stretching.

Extrusion presses also supplied

Accumulator vessels and pump stations for water and oil

Hydraulic controls, fully accessorized

Lead melting and aluminum ingot induction heating plants

Lead- and aluminum-sheath stripping machines
Aluminum sheath corrugators

150 YEARS
KRUPP
1811-1961

FRIED. KRUPP MASCHINEN- UND STAHLBAU RHEINHAUSEN, GERMANY

In the Continental US contact: KRUPP INTERNATIONAL INC., 375 Park Ave., New York 22, N.Y.

To Head Production for Bethlehem on West Coast

Stewart S. Cort has been elected vice president, Bethlehem Steel Co., in charge of the company's Pacific Coast Division. Mr. Cort succeeds **H. Harrison Fuller,** who died April 22.

Reeder Retires from J & L

A. M. Reeder, who has served as a Metallurgical Engineer for the **Jones & Laughlin Steel Corporation** in Pittsburgh, Pa., having reached the age of retirement, concluded his active work for the company on April 30, 1961.

* * *

Mr. Reeder, or Mike, as he is known, was the Mordica Memorial Lecturer in 1944 at the Annual Convention of The Wire Association held in Pittsburgh in that year, his subject being "Carbon Steel for the Wire Industry".

* * *

He has been a member of The Wire Association for much of the last 30 years and has, besides serving on a number of committees, been a director for two three-year terms.

* * *

Following a brief vacation, Mike plans to act as a consulting engineer for those in the industry who may require such services. He may be reached at 616 DeWalt Drive, Pittsburgh 34, Pa.

A. M. Reeder

Mueller Brass Elects Two Vice Presidents

Alden C. Hensel, formerly Works Manager, has been elected vice president-manufacturing of Mueller Brass Co., Port Huron, Mich., and **Frank B. Rote** has been elected vice president-technical director.

Gordon Murphy

Gordon Murphy, 49, Vice President of **Foote Bros. Gear & Machine Corp.,** Chicago, and of its subsidiary, **The Whitney Chain Co.,** of Hartford, Conn., died suddenly on Wednesday, April 26, at his home at 809 Vine St., in Hinsdale, Ill.

* * *

Mr. Murphy had been with the Chicago firm for 14 years, and was previously connected with Fairbanks Morse & Co. A native of Sanborn, N. Dak., he graduated from the U. S. Naval Academy in Annapolis, and served as a submarine officer during World War II.

LOW COST precision wire plating

MAINTAIN UNIFORM COATINGS AT HIGH SPEEDS!

CONTINUOUS ELECTROPLATING EQUIPMENT

This low cost equipment performs with ease and efficiency that mean real savings. Preset quality control insures perfection without depending on operators' skill. No toxic fumes, clean operation at low temperature, elimination of work hardening during processing and many other features are the result of experience and sound engineering that go into the design of all Universal equipment.

We furnish complete installation . . .
For further information write to:

UNIVERSAL INDUSTRIAL EQUIPMENT CO.
SECAUCUS, NEW JERSEY SOLE AGENT IN CANADA: E. V. LARSON CO., LTD., TORONTO, CANADA

U. S. PATENT # 2823180 AND FOREIGN PATENTS PENDING

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,981,972, POULTRY SHACKLE, patented May 2, 1961 by Ralph S. Zebarth, Hickman Mills, Mo., assignor, by mesne assignments, to Gordon Johnson Company, Kansas City, Mo., a corporation of Missouri.

The shackle is constructed of a length of bar material bent to shape.

* * *

No. 2,982,317, MACHINE FOR MANUFACTURING REINFORCED FABRICS, patented May 2, 1961 by William F. Richardson and Eugene J. Hood, Carthage, Mo., assignors to Flex-O-Lators, Inc., Carthage, Mo., a corporation of Missouri.

More specifically, the 27 claims of the patent are directed to an electrically-operated reinforced wire fabric making machine.

* * *

No. 2,982,323, COILED SPRING WASHER HAVING COILS BEARING OPPOSED VERTICLES AND TROUGHS, patented May 2, 1961 by Friedrich Karl Vossloh, 10 Steinworth, Werdohl, Germany, and Hermann Meier, 41 Marienstrasse, Minden, Germany.

A spring washer of rectangular wire is disclosed, helically coiled to form one complete middle convolution and upper and lower end convolutions.

* * *

REISSUE 24985, METAL COATING APPARATUS WITH MOVABLY MOUNTED WIPING MEANS, patented May 9, 1961 by Robert F. Renkin, Sharon, Pa., assignor to Sharon Steel Corporation, Sharon, Pa., a corporation of Pennsylvania.

The apparatus is for continuously hot-coating metal strip selectively with different coating metals. There are 10 claims in the reissue of the original patent.

* * *

No. 2,983,465, WIRE REEL, patented May 9, 1961 by John J. Skubal, Milwaukee, Wis., assignor to McGraw-Edison Company, Milwaukee, Wis., a corporation of Delaware.

An adjustable reel for wire is disclosed having an expander mechanism for producing radial movement of the wire carrier portion of the reel.

* * *

No. 2,983,502, METHOD AND APPARATUS FOR ANNEALING COILS OF METAL STRIP, patented May 9, 1961 by Robert E. McClure, Jr., Pittsburgh, Pa., assignor to United States Steel Corporation, a corporation of New Jersey.

The method includes placing a coil with its axis vertical on a bearing surface, placing on the coil a pair of bearing plates spaced apart, one overlying the other, placing a second coil on the upper of the last-mentioned plates, enclosing the resulting stack, discharging and igniting a combustible mixture of gases around the space between the pair of plates and exhausting burned gases from the space thereby heating the coils principally by conduction through the plates directly into the edges of the coil piles in contact therewith.

* * *

No. 2,984,357, ELECTRICALLY HEATED SCREEN FOR SEPARATING COARSER MATERIAL FROM ACCOMPANYING FINES, patented May 16, 1961 by Josef Kufferath, Mariaweiler, near Duren, Germany.

The wires are so shaped and disposed that the opening in the screen has a pair of opposite walls formed by two adjacent wires of one group, the wall being closest spaced from each other adjacent the top surface, and diverging from the area of closest spacing toward the bottom surface.

* * *

No. 2,985,290, ONE-PIECE SPRING CLIP FOR RECORDING TAPE REELS, patented May 23, 1961 by Charles R. Locklin, 2140 Lochaven Road, Pontiac, Mich.

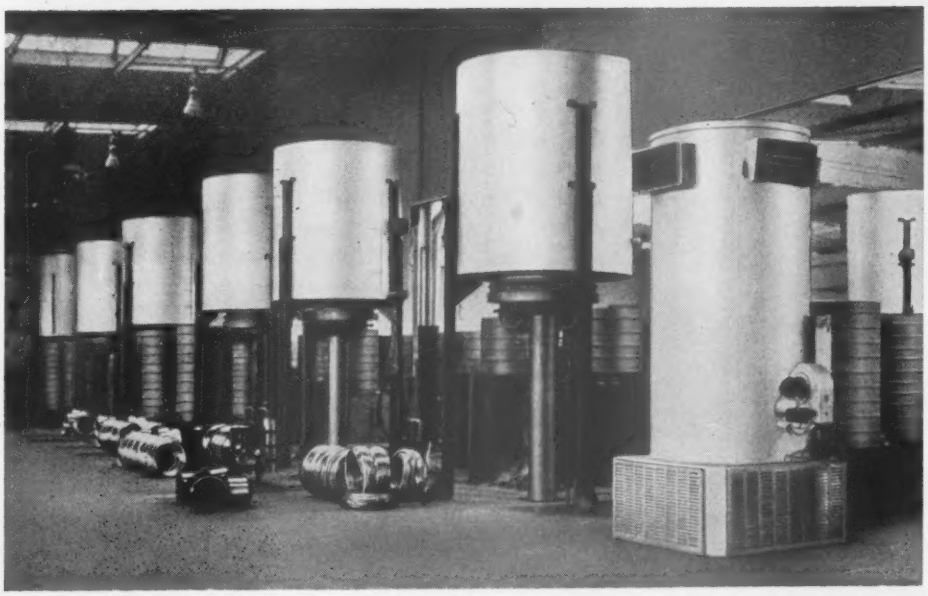
A one-piece clip is disclosed adapted to simultaneously frictionally grip the side disc peripheries of a tape reel and the outer end of a recording tape wound thereon.

* * *

No. 2,985,392, APPARATUS FOR WINDING A COIL ON A CLOSED CORE, patented May 23, 1961 by Milton C. Clerc, Houston, Tex., assignor to Texas Instruments Incorporated, Dallas, Tex., a corporation of Delaware.

The construction is such that the core, spool and coil can be removed from between a bearing shaft and support by merely sliding the core parallel to the axis of the shaft in

Now also for Stainless and Chrome-Nickel!



FRITZ - VACUUM FURNACES HELP TO SOLVE YOUR ANNEALING PROBLEMS.

(German and Foreign Patents)

★

SOLE REPRESENTATIVE:

PAUL REICHER
Machinery & Equipment
600 Eglinton Ave., East,
Toronto 12, Ont., Canada

WRITE TO: FRITZ INDUSTRIAL FURNACES HAGEN, P. O. B. 448 (W.-GERMANY)

the direction of the free end of the shaft.

★ ★ ★

No. 2,985,404 MEANS FOR DISPENSING COILED WIRE FROM A CONTAINER, patented May 23, 1961 by Frank K. Tashiro, 1211 Holgate St., Seattle, Wash.

An especially-constructed paper box is provided for housing and dispensing a coil of wire.

★ ★ ★

No. 2,985,900, WASHER AND SCREW ASSEMBLY MACHINE HAVING SCREW INSERTER RESPONSIVE TO PRESSURE OF WASHER, patented May 30, 1961 by Felix Maximin Edmond Nouvelet, Paris, France, assignor to Gobin Daude S. A., Paris, France, a joint-stock company of France.

There are 10 claims in this patent on a machine for preparing compound systems constituted by screw blanks fitted in washers prior to the rolling of the threads on the blanks in thread-forming devices.

★ ★ ★

No. 2,985,932, SPRING CLIP, patented May 30, 1961 by Joseph H. Windish, 570 Highland St., Enhaute, Pa.

A spring wire clip is disclosed comprising a helical coil spring, and a separate arm extending from each end of the coil spring.

★ ★ ★

No. 2,985,950, METHOD OF MANUFACTURING COILS, patented May 30, 1961 by Abraham M. Duman, Highland Park, Ill., assignor to Advance Transformer Co., Chicago, Ill., a corporation of Illinois.

More specifically the patent relates to forming an insulating sheath on at least one end terminal of electric wire coils.

★ ★ ★

No. 2,985,951, WIRE WOUND RESISTOR AND METHOD OF MAKING THE SAME, patented May 30, 1961 by Benjamin Solow, North Hollywood, Calif., assignor to International Resistance Company, Philadelphia, Pa.

A method is disclosed of making an encapsulated wire-wound electrical resistor includes the steps of leaving at least a portion of the turns of the resistance wire which are wound as a single layer exposed, then adjusting the resistance value by grinding away the outer surface of the exposed turns of the resistance wire, and then casting a protective jacket of the electrical insulating material directly around the exposed turns of the resistance wire to completely enclose the same.

★ ★ ★

No. 2,985,994, APPARATUS FOR PRODUCING STRANDED CABLE COMPONENTS, patented May 30, 1961 by Herbert Menke, Berlin-Spandau, Rudolph Stocker, Monchroden, near Coburg, and Fritz Wilke and Wilhelm Wirth, Berlin-Siemensstadt, Germany, assignors to Siemens-Schuckertwerke Aktiengesellschaft, Berlin-Siemensstadt, Germany, a corporation of Germany.

Apparatus for producing communication cable components from individual conductors, quads and the like is covered by 10 claims. The take-up speed of the cable component is continuously adapted to the supply speed of the strands.

★ ★ ★

No. 2,986,116, WIRE ENAMELING DIE, patented May 30, 1961 by Paul J. Zerwes, Chicago, Ill., assignor to Chicago Magnet Wire Corporation, Chicago, Ill., a corporation of Illinois.

Fourteen claims to this patent. A pair of telescoping cylindrical members are provided having an inlet opening into the inner member from one end and a coating-forming aperture at the opposite end for passing a wire through the aperture in a continuous coating process, these members being rotatable and axially displaceable one relative the other and being movable one relative the other between a first position in which the entrance is rendered operable and a second position in which the entrance is rendered inoperable. The aperture is provided only in second position of the members, and the members having cooperating terminal formations forming aperture in the second position.

★ ★ ★

No. 2,986,184, SHANK GRIPPING WIRE FRAME CLAMP, patented May 30, 1961 by Leslie M. Curtis, 195-20 56th Ave., Flushing, N. Y.

The clamp includes a pair of L-shaped wire frames and a plate mounted thereon.

★ ★ ★

No. 2,986,350, COIL WINDING MACHINE, patented May 30, 1961 by Kenly C. Bugg, Fort Wayne, Ind., assignor to Kendick Manufacturing Company, Inc., Fort Wayne, Ind., a corporation of Indiana.

This coil-winding apparatus for winding coils on toroidal cores includes toroidal core, an interrupted bobbin gear and a bobbin carried by said gear, the core supporting means supporting a core with a portion thereof within the gear, the interruption in the gear permitting insertion of the core in the core supporting means, means for rotating

(*Please turn to page* 942)

the latest HIGH SPEED
TUBULAR STRANDING MACHINE
from HANSON & EDWARDS . . .

. . . for the cable and wire rope industries.

* External wire guides increase efficiency—reduce "down-time"—provide quick, easy threading.
* Overall dimensions reduced—increased speed.
* Electro-mechanical or electrically operated air brakes to choice.
* Rotor runs in large split roller bearings.
* Direct gear-driven capstan gives positive lays.

19-12½ bobbin machine, one of the new models now in production. The capstan unit, with cantilever mounted haul-off sheaves, is a complete separate unit coupled by shaft and flexible coupling to the main machine.

HANSON & EDWARDS LTD

WARRINGTON ENGLAND

SALES ORGANISATION:
JAMES DAY (MACHINERY) LTD 28 MADDOX STREET LONDON W1

U.S. AGENTS:
THE EDMANDS COMPANY 860 WELLINGTON AVENUE CRANSTON 10, R.I.

P5078

Automatic Wire Stripper

A six-page brochure on the new Model 810A Automatic Wire Stripper, with descriptions and photographs of new quick-change features, includes photos and descriptions of an automatic wire prefeed, wire stacker and other accessories.

* * *

For a copy, write **Eubanks Engineering Co.**, 260 N. Allen Ave., Pasadena, Cal.

Bulletin on Draw Furnaces

Sunbeam Equipment Corp., Meadville, Pa., has issued a six-page bulletin describing the features and applications of a new Sunbeam continuous draw furnace for ferrous and non-ferrous metals.

* * *

The furnace is designed for high-speed production of springs, fasteners, tools and a wide variety of small parts that require heat treatment. The bulletin will be sent by the company upon request.

Zinc-Magnesium Alloy Offered To Hot-Dip Galvanizers

A zinc-magnesium alloy for the hot-dip galvanizing of steel now is available commercially.

* * *

First to reach the market with this alloy (97% prime western zinc, 3% magnesium) is **Eagle-Picher Company**, of Cincinnati.

* * *

The alloy is the result of wide interest created by recent news of improved corrosion resistance obtained when a small amount of magnesium is added to the galvanizing bath.

* * *

Thus far, the only method of commercially applying the new process has been to add magnesium ingot directly to the bath. The zinc-magnesium alloy is designed to simplify the process and will be used in combination with regular prime western slabs.

* * *

Studies by **The Dow Chemical Company's** Electrochemical Research Metal Cleaning Departments in Freeport, Texas, have shown that "very significant improvements in corrosion resistance are obtained when magnesium is present in amounts of 0.04 to 0.05 per cent by weight in the galvanizing bath." Dow's six-year evaluation program indicated corrosion-resistance improvement of 20 to 90 per cent in industrial-marine environments.

Bulletin on Selsyn Indicating Systems

Bulletin GEA-7218, 6 pages, gives date for remote indication and remote control. This brochure details some of the many possible applications of the G-E selsyn monitoring system. It lists several of the indicator arrangements available, such as geared indicators, digital counter-type readouts, special voltage and frequency readers, and specially illuminated, custom-designed re-

HOW TO CUT HIGH MAINTENANCE COSTS... SPEED CUTTING OPERATIONS

From rod and wire mills everywhere come reports that down-time for repairs is practically non-existent with the Porter Hydraulic. Add to this — *faster* cutting, and you have these vital ingredients for boosting your production. Two features found *only* in Porter Cutters make this efficiency possible.

CUTTER BLADES WITH
• MORE BEARING SURFACES
.... WON'T BREAK DOWN!

Because blades are longer they have more bearing surfaces for *rigid* alignment, thus eliminating any side thrust which causes breakage.

Filtered air taken into the cylinder is forced out around the movable blade on each cut, eliminates danger of dirt reaching bearing surfaces causing oil leakage and wear.

A HYDRAULIC SYSTEM OF FOOL-PROOF DESIGN! One-hose design cuts replacement costs in half. Adjustable relief valve saves wear and tear by providing the correct pressure for any cutting job. Hydraulic oil is filtered by an easy-to-change 40 micron oil filter. And a safe 12-volt control switch on the cutterhead gives instant finger-tip control of the cutting action.

WRITE FOR ON-THE-JOB DEMONSTRATION OR ROD AND BAR CUTTER CATALOG

AVAILABLE NOW! 3 CUTTERHEADS with capacities up to 1⅜" steel rods. 5 HYDRAULIC POWER UNITS. Matched to your exact requirements. Specially designed heads for other non-cutting applications, such as punching, crimping, heading, forming.

H. K. PORTER, INC.,
Somerville 43, Mass.

corders for wall or floor mounting. This bulletin describes use of cam-operated limit switch as an automatic feedback control. Brochure gives specification tables for customer use to select dial type, degree of accuracy desired, appropriate indicators and transmitters. Diagrams show approximate dimensions. For a copy write **General Electric Company**, Schenectady 5, N. Y.

PCI to Meet in October

The theme of the national convention of the Prestressed Concrete Institute to be held in Denver, October 15-19, will be: "New Opportunities in Structural Design".

* * *

Convention Chairman **Jack Perlmutter** said the theme was chosen by his planning committee after a study of developments in the prestressed concrete industry during the past year.

* * *

It is expected nearly 1,000 persons, including delegates, architects and engineers will attend the convention to be held in two of Denver's largest hotels, the Brown Palace and the Cosmopolitan.

* * *

Plans call for a full program of speakers, seminars and social events.

Report on Pressure Blasting

A special report on pressure blasting with manufactured abrasives has been published by Norton Company. This report describes the areas of application for pressure blasting and the various media used. Emphasis of the report is on the proper selection and use of aluminum oxide and silicon carbide abrasive. Charts and drawings provide useful operating information and procedures for the popular types of media and equipment.

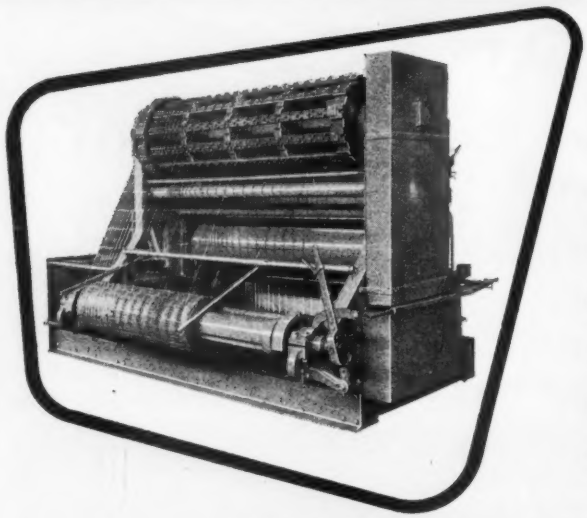
* * *

For a free copy, write to Advertising Department, **Norton Company**, Worcester 6, Mass.

New Temperature Scale Adopted

The International Temperature Scale was revised at the 11th General Conference on Weights and Measures in Paris, October, 1960. The scale's name was changed to the International Practical Temperature Scale. No values of temperature have changed, but the triple point of water (0.01 degrees C) has replaced the ice point as one of the six defining points on the scale. The new value was chosen because it can be obtained more easily and accurately in the National Bureau of Standards laboratories. The other fixed points are the oxygen point (-182.97 degrees C), the steam point (100.000 degrees C), the sulphur point (444.6 degrees C), and the freezing points of silver (960.5 degrees C) and gold (1063 degrees C). Fixed points are the standard temperatures from which all temperature instruments are calibrated. They serve as an accurate base for all temperature relationships in the centigrade scale. For additional de-

Interlocking FENCE LOOMS



- Fastest—Most Efficient
- Preferred by Leading Mills
- Low Maintenance Cost
- Wrapped Stay Fence
- Straight Stay Wires
- Integrated—Space Saving
- Replaceable Main Bearings
- Single or Double Strands
- Years of Low Cost Production

Write for Detailed Information — Without Obligation

Interlocking Fence Co., Box 8, Morton, Ill.

SPECIALISTS IN FENCE LOOMS

tails, write the NBS Office of Technical Information, U. S. Dept. of Commerce, Washington 25, D. C.

New Metal Emblem Tags

A new simple, highly effective, identification system has been developed for the metal industry — steel tags with distinctive shapes. Called "Eve-Dent Tags," they are available in over 100 different styles — each with its own predetermined meaning.

* * *

Unlike other forms of identification, these tags may be attached to the raw material and kept on until final consumption. They won't lose their shape despite severe heat and extreme weather conditions, eliminating the need for retagging. They save time because they can be recognized from a distance and can be used by illiterate personnel — important when shipping overseas. In addition, they are inexpensive, costing only about a half cent each.

* * *

Although recently introduced, they are being used with great success by a growing number of wire and rod producers. For complete information, write **Broomall Industrial Sales Co.**, 55 East Ann Road, Broomall 54, Pa.

Some Eve-Dent Tag Shapes

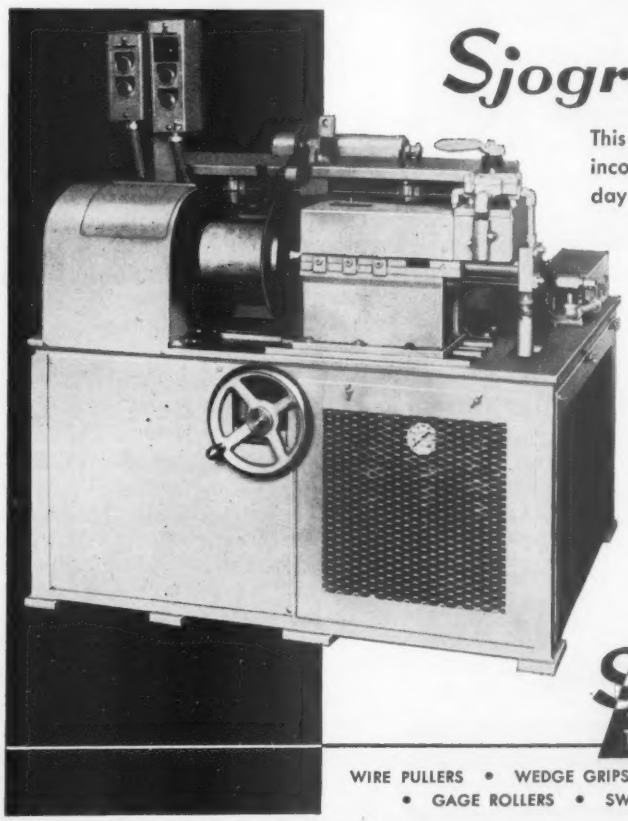
* * * *

To Conduct Magnaflux Training Course

Intensive five - day training courses in nondestructive testing conducted regularly by **Magnaflux Corporation** at 7300 W. Lawrence Ave., Chicago, Ill., now are under the direction of **Bruce D. Tyler.** Mr. Tyler, who joined Magnaflux in October of 1960, has compiled a diversity of quality control and testing experience in both military and industrial capacities since graduating from college in 1948.

* * *

Each week-long training class includes a survey of the fundamentals of metalworking, fabrication techniques, and the origin of defects in materials and parts. Under the tutoring of Mr. Tyler, students learn the theory of magnetic particle and fluorescent penetrant inspection, the techniques for creating indications of defects, interpretation of indications, and evaluation of parts in question as to service life and



Sjogren SPOOLER

This machine is especially designed for wire mill use and incorporates many outstanding features adapted to present day high speed production.

SPEED — When placed directly behind wire drawing machine the Sjogren Spooler is capable of spooling at 1800 fpm.

CAPACITY — 100 pound maximum.

TRAVERSE — Hydraulic traverse is infinitely adjustable from zero to ⅝" per rpm of spool.

LOADING — Loading of spool is air-actuated.

TENSION — Louis-Allis eddy current clutch type motor with potentiometer for variable tension.

STARTING — Forced acceleration circuit prevents slack wire during wire drawing machine acceleration.

BRAKING — Goodyear airplane disc type brakes.

USED BY WIRE MEN WHO WANT THE BEST!

Sjogren TOOL & MACHINE CO., INC.

14 Sword St.
AUBURN, MASS.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • GAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

final disposition.

* * *

Classes are limited to eight men, usually comprized of supervisors of quality, inspectors, metallurgists, operators, and those responsible for training operators. Two days are devoted to class discussion and lectures. The balance of time is utilized for laboratory demonstrations where each student processes actual pieces from a "library" of over 800 typical parts having known defects.

New D-H Vacuum Treatment Unit Shown

The Crucible Steel Company of America held a plant tour and technical session for approximately 50 members of the daily, technical and trade press on May 11, to demonstrate the first D-H vacuum treatment unit in America, and discuss its importance to users of specialty steels. During the plant tour of Crucible's Midland, Pa., Works, a 170 ton heat of open hearth steel was processed through the unique unit which improves the quality of steels by removing harmful impurities.

* * *

E. A. March, Director of Technology, stated that there has been a rising demand for cleaner, higher performance, more reliable steels. Vacuum melting has provided an answer, but at rather high cost and in limited tonnage. The new D-H (Dortmund-Horder) process achieves a major step in the direction of excellent quality at a very modest increase in cost over air melted steels. **C. D. Preusch,** Development Manager, presented evidence, in terms of macro-etch, magniflux, gas content and other tests, to demonstrate the improvement in quality of both electric furnace and open hearth steels. **Dr. A. M. Aksoy,** Chief Metallurgist, spoke on other vacuum processes to provide a clearer idea of the place of the new process in steel making.

* * *

The D-H vacuum treatment equipment, the largest such unit in the world, began experimental operation in October 1960. Since that time, Crucible's technical team has been evaluating its effects on carbon, alloy and specialty steels. It was built by Lectromelt Division of McGraw-Edison Company of Pittsburgh, Pa., under license of Dortmund-Horder Huttenunion of Dortmund, West Germany.

Catalog on HV Test Sets

A new 8 page catalog of High-Voltage Test Sets and HV Power Supplies is available from **Peschel Electronics, Inc.,** Towners, Patterson, N. Y.

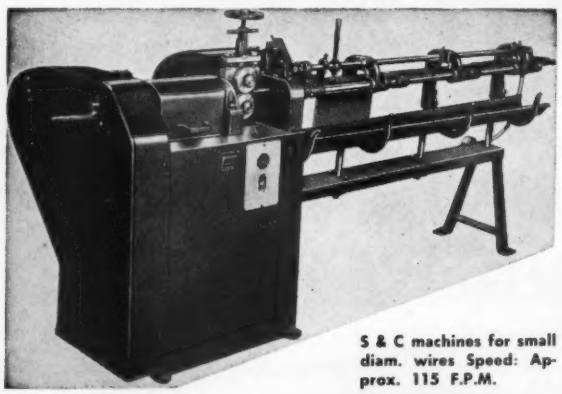
* * *

The catalog lists 10 pieces of new equipment recently released, including a special Cable Hipot Tester; Insulating Oil Dielectric Tester; Multiple Output Dielectric Test Set; an Economical AC/DC Test Set; 150 KV, 15

FAST! ACCURATE! RELIABLE!

CHARACTERISTICS OF THE

WELLS STRAIGHTENER & CUTTER



S & C machines for small diam. wires Speed: Approx. 115 F.P.M.

The time-proven WELLS line combines maximum efficiency with that rugged dependability, for which WELLS S&C machines have become justly famous.

Built in several sizes to handle 2 to 18 ga. basic and high carbon wire.

FEATURES

The guide bar of these fine machines can be supplied for any cut lengths • The rotary flier runs on ball bearings for smoothness and long life • Cut-off is actuated by a solenoid for extreme accuracy of cut lengths • A two point cam construction provides a quick and positive return of the cut-off knife, eliminating the need for a clutch and dog • A counter is standard equipment.

A COMPLETE RANGE OF S & C MACHINES IS MADE BY WELLS FOR ALL SIZES OF WIRE. SEND FOR CATALOG ON THE COMPLETE LINE.

Frank L. Wells Company

Builders of Fine Wire Working Machinery

5821 FIFTH AVENUE • KENOSHA, WISCONSIN

KVA AC Test Set; a Versatile HV AC Test Set With Multiple Secondaries; a Motorized Output HV Test Set; an Industrial HV DC Power Unit; Calibrating Unit for Corona Test Sets; and a unique Corona Pick-Up Network.

New American Machinery Company is Division of Mentor Products

A complete major machinery engineering and manufacturing facility has been added to Greater Cleveland industry with the recent organizing of **American Machinery Co.,** (AMCO), a division of **Mentor Products, Inc.,** Mentor,

George H. Perkins

Ohio, according to **George H. Perkins,** President of the new firm.

* * *

Associated with Perkins are industrialists **Richard V. Urban, Donald R. Whiteman, Edward Davenport, Richard O. Colgrove,** and **Robert F. Urban.** Brothers Richard V. and Robert F. Urban are co-presidents of parent corporation Mentor Products and are directing manufacturing. Donald R. Whiteman is in charge of sales. Since 1944, Mentor Products has been contract manufacturing capital equipment, machinery and automation used in steel mills and the metal working market.

* * *

Heading design and engineering is **George H. Perkins,** whose machinery developments first gained national fame with the dramatic activities of Sperry Development prior to World War II. As a member of the "Sperry Team", he participated in the first "feathered" propeller and first diesel engine for aircraft, now displayed in the Smithsonian Institution. Equipment for testing rails (sponsored by American Railway Association) was another early development. Following these were a long series of major machinery designs, including the first of large aluminum plate edge trimming machines and rolling mills (hot and cold) heavy hydraulic presses for forming, briquetting, etc., in the steel, copper, brass and aluminum industries. Later, he introduced processing and handling equipment for speeding war production in the wire industry, including a rotary type welding-wire cutting machine — fastest in the field — which relieved critical war shortages. Among his many machinery

800 times
round the Equator reach the
4.9 million tons
of wire rods produced by us in all
home-market- and export qualities.
Our new wire-rod mill
produces a material with
smallest tolerances of diameter.
H
HWR
R
HÜTTEN- UND BERGWERKE RHEINHAUSEN AG.
HÜTTENWERK RHEINHAUSEN · GERMANY
Agent: M. WIMPFHEIMER & SON, INC. 250 WEST 57th STREET, NEW YORK 19, N.Y. TEL. CIRCLE 6-9384

developments in wire products are: a nail machine for high-production nail manufacturing; a high-speed wire-stranding machine used in heavy-duty tire cording; and various types of efficient wire spooling equipment. Among his previous associations with major industries was a ten-year period with **American Steel & Wire Div.**, U. S. Steel Corporation.

* * *

According to Mr. Perkins, AMCO is shortly to introduce two new products for the ferrous and non-ferrous metalworking fields; details to be announced shortly.

New CF&I Rope Shows Superior Flexibility

The Colorado Fuel and Iron Corporation has completed an extended series of laboratory tests which furnished them with additional proof that Double Gray-X, CF&I Wickwire's premium wire rope, has an average of 45% more bending life than other wire ropes tested.

The tests, conducted over the past year at CF&I's Palmer (Mass.) Plant, were given to four other brands of wire ropes in addition to Double Gray-X. The ropes tested were all identical in size and specification, and all exceeded the catalog breaking strength of extra-improved plow steel ropes. Each rope was subjected to the same series of tests on a 25,000-pound, multiple-reeved fatigue machine, the largest of its kind, which punished the wire rope to destruction by bending it back and forth over sheaves.

* * *

The results showed that Double Gray-X lasted longer than any of the competing wire ropes at all the safety factors used in the test. At the highest and most commonly-used safety factor, Double Gray-X lasted 30% longer than the rope that lasted next longest and 68% longer than the rope that lasted the shortest time, 45% longer than the average of all other wire ropes tested at the 5.78 safety factor.

* * *

Double Gray-X, developed last year, is a result of a new wire drawing technique developed by CF&I Wickwire's research laboratory and wire mill at Palmer. It is made from extra improved plow steel with independent wire rope core, having the same wire as the surrounding rope strands.

* * *

One of the important factors in the outstanding fatigue-resistance of Double Gray-X is the use of molybdenum disulphide in the drawing, which builds a thin, permanent molecular shield around each wire that helps separate the wires and cushions them against the effects of bending, crushing and abrasion.

New Temperature Measuring Instrument

Wire manufacturers may now solve their extremely critical problems of accurate temperature measurement and control with a new **non-contact** infrared

ALUMINUM INGOT AND MILL PRODUCTS: MARCH 1961

(Shipments and receipts are in thousands of pounds)

Item	Number of companies reporting shipments	March 1961			February 1961* net shipments	March 1960 net shipments
		Gross[1] shipments	Receipts[2]	Net[3] shipments		
ALUMINUM PIG AND INGOT, TOTAL	82	227,068	111,589	115,479	116,787	165,848
ALUMINUM MILL PRODUCTS, TOTAL	164	302,203	20,518	281,685	232,547	267,276
Sheet and plate, non-heat-treatable	29	123,596	16,210	107,386	87,517	106,326
Sheet and plate, heat-treatable	7	(D)	(D)	20,357	16,665	16,559
Foil, including foil in lamination	16	(D)	(D)	24,139	20,424	21,172
Rolled and continuous cast rod and bar[4]	7	10,510	2,738	7,772	6,712	8,520
Wire, bare, conductor and nonconductor	17	4,722	111	4,611	3,472	5,493
ACSR and aluminum cable, bare	12	19,508	80	19,428	15,489	14,746
Wire and cable, insulated or covered	16	4,731	21	4,710	4,561	4,655
Extruded shapes, alloys other than 2000 and 7000 series	103	70,178	1,042	69,136	57,997	68,437
Extruded shapes, alloys in 2000 and 7000 series	8	4,255	...	4,255	3,386	3,801
Drawn tube, alloys other than 2000 and 7000 series	10	6,636	...	6,636	5,427	6,217
Drawn tube, alloys in 2000 and 7000 series						
Welded tube, non-heat-treatable	6	5,593	...	5,593	[5]4,107	4,047

*Revised.

D Withheld to avoid disclosing figures of individual companies. These figures are included, however, in the appropriate total.

[1]Gross shipments of mill products represent total shipments by producers to customers, including other producers, and shipments by producers to their own fabricating departments which manufacture products beyond the level of mill shapes. Ingot gross shipments include shipments by importers.

[2]For mill products, represents receipts from domestic producers only. In addition to receipts from domestic producers, 1,086,000 pounds of mill shapes were received through imports. For ingot, receipts from imports are included.

[3]For mill products, derived by subtracting the sum of producers's domestic receipts of each mill shape from the industry's gross shipments of that shape. Ingot data derived by subtracting all receipts from shipments reported.

[4]Includes a small amount of rolled structural shapes.

[5]Includes a small amount of welded tube, heat-treatable.

radiation pyrometer — the Pyrotel — developed by **Mason Instrument Company, Inc.,** Mamaroneck, New York.

* * *

The Pyrotel will measure with extreme accuracy the temperature of wire, either stranded or solid conductor, "on the fly" even at speeds of 5000 feet per minute.

In the manufacture of insulated wire, for example, scrap and rejects can be sharply reduced with the use of the device on the production line. The instrument permits the manual monitoring of wire temperatures, or it may be tied into a system for continuous automatic reading, recording and stepless or proportional heat control.

* * *

For manufacturers of rod and wire who are dealing with patenting, annealing, stress relieving or tempering, the Pyrotel also offers precise means for continuously monitoring temperatures. Heating ovens and annealing furnaces may be automatically controlled to tight specifications with the Pyrotel. Likewise, the new instrument will read out critical temperatures, and enable automatic control of hot dipping operations such as tinning and enameling. Surface temperatures or inside dip solution temperatures, or both, may be measured.

* * *

As a true "wire temperature pilot", at practically every stage of the wire manufacture, the Pyrotel is an extremely versatile and adaptable instrument, capable of both **production** and **quality control.** The instrument may be positioned at any distance from the target process — from a few inches to as many feet away as may be required, with equal accuracy and with practically instantaneous response.

* * *

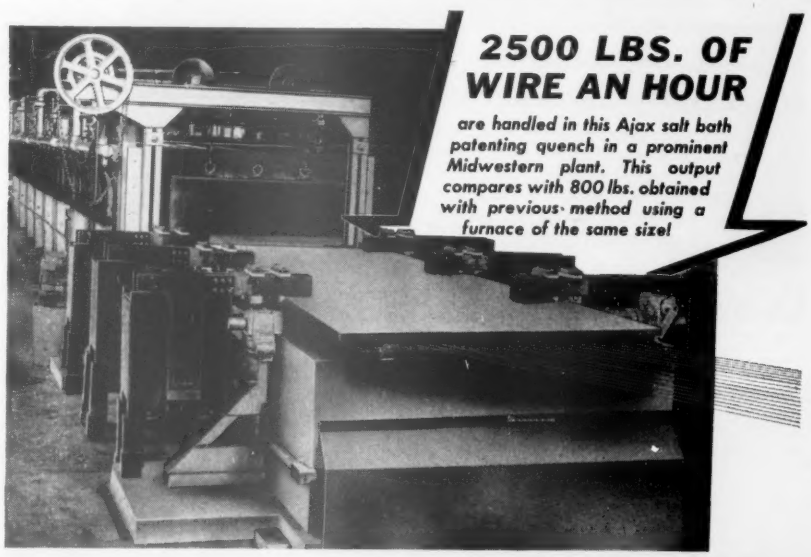
The instrument has already proven itself of value in many industrial fields utilizing heating processes, and now brings to the wire industry similar opportunities for process improvement and quality control.

* * *

Complete information is available from Mason Instrument Co., Inc., 222 Valley Place, Mamaroneck, N. Y.

AWS Fall Meeting In Dallas

The American Welding Society Fall Meeting will be held in the Adolphus Hotel, Dallas, Texas, September 25-28, 1961. Sixteen Sessions will be held and a total of 46 technical papers will be presented. For further details write to the Information Center, American Welding Society, 33 West 39th Street, New York, 18, N. Y.


2500 LBS. OF WIRE AN HOUR
are handled in this Ajax salt bath patenting quench in a prominent Midwestern plant. This output compares with 800 lbs. obtained with previous method using a furnace of the same size!

Here's maximum speed, accuracy and economy in Wire Patenting!

No other method offers so many possibilities for quality improvement and cost reduction in the patenting of high- and medium-carbon steel wire or rods. Automatic temperature control—an inherent result of Ajax internally-heated salt bath furnace design—provides continuous accuracy within ±5° F. throughout the bath. You are thus assured of the uniformity so vital to obtaining proper tensile strength and grain structure.

More poundage can be handled. Savings up to 30% in pickling time are common. Salt residue is easily removed by a water wash. The entire patenting process lends itself readily to inexpensive automation. Maintenance is negligible. Long-life, immersed-type electrodes can be changed in an hour or two—without tearing down furnace or pot. Pots last indefinitely.

AJAX
HULTGREN
SALT BATH FURNACES
Internally heated electric and gas-fired types

WRITE FOR AJAX CASE HISTORY BULLETINS ON: ☐ Patenting; ☐ Process Annealing; ☐ Descaling; ☐ Cleaning, Preheating, Fluxing.

AJAX ELECTRIC COMPANY 928 Frankford Ave., Philadelphia 23, Pa.

Evolution of Stranding Equipment for Exchange Area Cable at Western Electric Company

(*Continued from page 870*)

units. The Lay Tachometer and the Lay Selsyn driven by the cable control the core truck motor to maintain a constant lineal cable speed. The tachometer driven by the Twist Compensator motor maintains this motor in proper synchronism. A tachometer on the main core binder motor controls the main binder and all the oscillating face plates. The tachometer on each unit binder motor maintains that unit serving head at proper speed. As noted on the diagram generator field control is used on the main core truck, main core binder and oscillating face plate motors and rectified DC on the Twist Compensator and all Unit Binder motors. Each 27 sup-

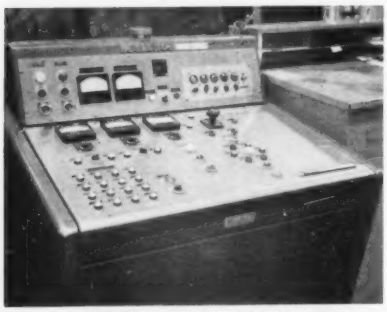
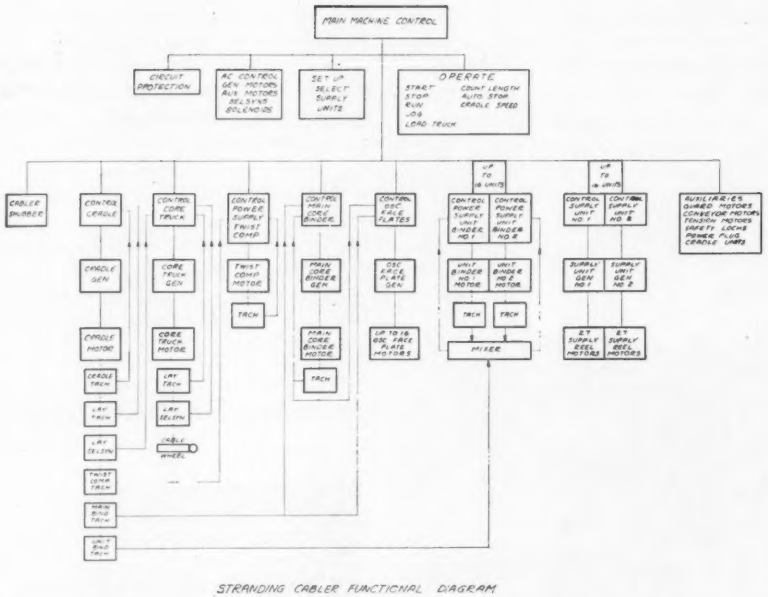


Fig. 20 — Stranding Cabler — Control Desk.


MAIN MACHINE CONTROL
CIRCUIT PROTECTION
AC CONTROL GEN MOTORS AUX. MOTORS SELSYNS SOLENOIDS
SET UP SELECT SUPPLY UNITS
OPERATE
START STOP RUN JOG LOAD TRUCK
COUNT LENGTH AUTO STOP CRADLE SPEED
UP TO 16 UNITS
CABLE CHASSIS
CONTROL CRADLE
CONTROL CORE TRUCK
CONTROL POWER SUPPLY TWIST COMP.
CONTROL MAIN CORE BINDER
CONTROL OSC. FACE PLATES
CONTROL POWER SUPPLY UNIT BINDER NO 1
CONTROL POWER SUPPLY UNIT BINDER NO 2
CONTROL SUPPLY UNIT NO 1
CONTROL SUPPLY UNIT NO 2
AUXILIARIES GUARD MOTORS CONVEYOR MOTORS TENSION MOTORS SAFETY LOCKS PRIMER PLUG CRADLE UNITS
CRADLE GEN.
CORE TRUCK GEN.
TWIST COMP. MOTOR
TACH
MAIN CORE BINDER GEN.
OSC. FACE PLATE GEN.
UP TO 16 OSC. FACE PLATE MOTORS
UNIT BINDER NO 1 MOTOR
UNIT BINDER NO 2 MOTOR
MIXER
SUPPLY UNIT GEN NO 1
SUPPLY UNIT GEN NO 2
27 SUPPLY REEL MOTORS
27 SUPPLY REEL MOTORS
CRADLE MOTOR
CRADLE TACH
LAY TACH
LAY SELSYN
CORE TRUCK MOTOR
MAIN CORE BINDER MOTOR
CABLE WHEEL
TWIST COMP TACH
MAIN BIND TACH
UNIT BIND TACH

STRANDING CABLER FUNCTIONAL DIAGRAM

Fig. 21 — Stranding Cabler — Functional Diagram.

COPPER - Consumption of refined copper in the United States, February-March 1961, in short tons

	Wire mills 1/	Brass mills 2/	Chemical plants	Secondary copper smelters	Foundries and miscellaneous	Total
February:						
Cathodes	174	7,419	(3)	71	(3)	7,664
Wire bars	58,185	4,133	(3)	---	(3)	62,318
Ingots and ingot bars	881	4,502	(3)	138	(3)	5,521
Cakes and slabs	------	9,352	(3)	2	(3)	9,354
Billets	------	11,675	(3)	---	(3)	11,675
Other	55	------	(3)	50	(3)	105
Total	59,295	37,081	(4)	261	(4)	4/98,637
March:						
Cathodes	------	8,840	(3)	67	(3)	8,907
Wire bars	68,026	3,981	(3)	---	(3)	72,007
Ingots and ingot bars	450	6,819	(3)	166	(3)	7,435
Cakes and slabs	------	13,065	(3)	2	(3)	13,067
Billets	------	15,813	(3)	---	(3)	15,813
Other	60	------	(3)	8	(3)	68
Total	68,536	48,518	(4)	243	(4)	4/119,297

1/ Includes all wire mills with rod-rolling facilities. 2/ Includes brass mills using copper in refinery shapes; some have rod-rolling facilities. 3/ Not available. 4/ Consumption by chemical plants, foundries, and miscellaneous plants not included. Estimate of 2,000 tons included in total.

ply reel motor group has a separate generator with field control for tension control and forcing during machine acceleration.

* * *

The machine operates at 140 RPM of the cradle and cable speeds up to 350 FPM.

Application of Paper Fillers in Electrical Cables

(*Continued from page 872*)

actual cabling process and beyond that into the cord set department. Operators find it much easier to work with only one filler per interstice as compared with many small yarns which may total 30 or more for a larger cord. Also for mills who have equipment designed to pull fillers off a creel larger put-ups such as 65 lb. reels are available which have as much as 39,000 feet of them, thereby keeping down-time for change to a minimum. Cord set departments are particualrly enthusiastic about this type filler which cuts down substantially on trimming time and enables the operator to easily make clean and accurate cuts.

* * *

We believe paper has a great future in the electrical cable field and this belief is substantiated by the enthusiasm of those who have updated their product with paper fillers. It is at this time difficult to say what the limitations on paper are, if there are any, for improvements in treatments, converting equipment and the raw sheet itself are constantly being made which make paper adaptable in applications. unthought of before. In recent months many cable manufacturers faced with rising jute costs have asked us, "What is the price outlook for paper in the future?" We can only answer by telling you that paper is a manufactured product made in many countries throughout the world and more or less controlled pricewise by a world market. It is not an agricultural product grown in only a few countries, subject to crop failures and certain countries' controlled economies. The price of paper is relatively stable because

CAMDEN WIRE CO., INC.

Wire Fabricators

PRODUCERS OF QUALITY FINE WIRE COPPER CONDUCTORS

SOLID • BUNCHED • STRANDED OR BRAIDED

BARE • TIN OR LEAD COATED & SILVER PLATED

"Heavy Tinned"

CAMDEN WIRE CO., INC.

40 MASONIC AVENUE • CAMDEN, NEW YORK

AT YOUR SERVICE

SPECIALIZED ENGINEERING
SPECIALIZED EXPERIENCE
SPECIALIZED MACHINERY
FOR
TWISTING • STRANDING • BUNCHING
Continuous Tension Control
For Precision-Quality

HASKELL-DAWES
MACHINE CO., INC.
2231 E. Ontario Street
Philadelphia 34, Pa.

the supply is always adequate — it is probably the most stable priced material used in your cables and we see nothing in the future to substantially change this.

* * *

We hope this has given you some insight in the general field of twisted paper cable fillers which may be helpful in your future planning.

* * *

In closing I'd like to stray just a little away from conventional fillers and mention some of the other products we are currently working with to provide fillers for special applications. Available today in commercial quantity is twisted polyethylene film which has found use in control and railroad control cables. Because of the low melting point of Polyethylene which has proven objectionable in some applications, we are doing some work now with Polypropylene film. Where a non-hydroscopic filler is required and tensile strength needed, also, we have supplied stranded or bunched Polyethylene and Polypropylene monofilament of an oriented type. In the paper field we are close to having on the market a moisture resistant filler for flexible cords which will meet C.S.A. standards for a non-hydroscopic flexible cord.

* * *

As the design and construction of electrical cables change so will your requirements for components such as fillers. We fully realize the necessity of constant product improvement to coincide with the changes in your industry and we stand ready to do our best to live up to your expectations.

New NBS Publication

Publications of the National Bureau of Standards July, 1957, to June 30, 1960, compiled by **Betty L. Arnold,** National Bureau of Standards Miscellaneous Publication 240, issued May 3, 1961, 391 pages, $2.25. (Order from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.).

This catalog presents a complete list of all National Bureau of Standards publications issued between July 1, 1957, and June 30, 1960. It also includes papers published by members of the Bureau staff in outside journals from 1950 through 1959. Complete author and subject indexes are provided, as well as complete instructions for obtaining Bureau publications.

* * *

The Bureau's series of publications are of two types: periodical and nonperiodical. There are three periodicals: **The Journal of Research; The Technical News Bulletin;** and **Basic Radio Propagation Predictions. The Journal of Research** regularly appears in four sections: Section A — Physics and Chemistry; Section B — Mathematics and Mathematical Physics; Section C — Engineering and Instrumentation; and Section D — Radio Propagation. Nonperiodical publications of the National Bureau of Standards include Monographs; Handbooks; Miscellaneous Publications; Applied Mathematics Series; and Technical Notes. Nonperiodical publications, and papers published in the Bureau's **Journal of Research** are abstracted in this catalog.

* * *

This catalog is intended to accompany NBS Circular 460 (1901-1947, $1.25) and Supplement to NBS Circular 460 (1947-1957, $1.50). The complete set thus lists all scientific and technical publications published by the Bureau between its inception in 1901 and June 30, 1960.

NOTE: Foreign remittances must be in U. S. exchange and should include an additional one-fourth of the publication price to cover mailing costs.

A Unique System of Gauge and Tension Control in a Steel Mill

(*Continued from page* 884)

small, and in fact, the whole system is based on a policy of doing automatically what the operator would normally do without such equipment.

* * *

In addition, a series of protective arrangements to ensure the equipment will automatically fail

HEAVY COIL WRAPPING MADE EASY WITH LARMUTH'S NEW 12" MACHINE

Now Glues The Paper As It Wraps

12" MACHINE

A LARMUTH *Spiral Wrapping* MACHINE

WITH PATENT MECHANICAL LOADING AND EJECTION

FOR COILS UP TO 12" WIDE

PUSH BUTTON CONTROLLED

LARMUTH *of England*

U.S.A. and Canadian Agents: Loewy Machinery Supplies Company Ltd., 305 East 47th St., New York 17, N. Y. and 1117 St. Catherine St., West, Montreal 2, Que. Canada

LARMUTH (1947) LTD., BROOK STREET, KNUTSFORD, CHESHIRE, ENGLAND

Telephone: Knutsford 2244/5

to safety in the event of faulty operation, is included, and this leaves the mill control in such a condition that the operator who receives a warning of such an occurrence, can take over and carry on with normal manual operation which can over-ride the automatic system at all times. The automatic gauge control was installed in March, 1960, and has been in satisfactory operation ever since. Further developments of the equipment have led to the inclusion of automatic tension control between all stands. This development has gone forward in stages and the final control between stands four and five has been installed and commissioned recently.

* * *

One of the interesting points about this equipment is that except for warming up the mill after a roll change, it can be left switched on and in control of the mill at all times, with the obvious advantages that arise. Since using this equipment, the amount of off-gauge at the front end of the coil has been substantially reduced. The system cannot improve the gauge at the tail end of the coil, as this is already maintained until after the strip leaves No. 1 Mill. A further improvement is that off-gauge associated with welds has also been reduced. Apart from a definite improvement in the amount of off-gauge, this equipment, together with the X-ray gauge, has given a very much more consistent product.

* * *

Further development work is now in hand to simplify the pulsing amplifiers used in the control system. They are being redesigned to incorporate transistors as a form of contactless switching, replacing the conventional valves and relays and thereby providing a static control system. In addition work is now in hand to permit the installation of similar controls on the 4-stand Cold Reduction at Ebbw Vale.

JOIN

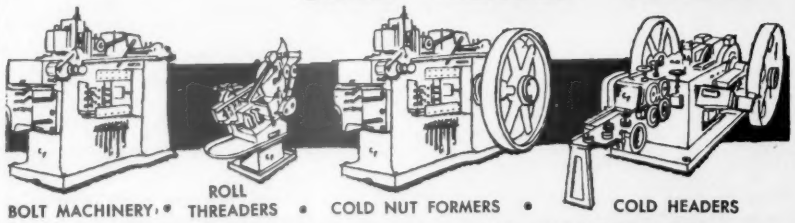
THE WIRE ASSOCIATION

NEW!

Price—25% Off

COLD HEADERS ✓
ROLL THREADERS ✓
COLD NUT FORMERS ✓
BOLT MACHINERY ✓

SOLD • LEASED • TRADED



BOLT MACHINERY • ROLL THREADERS • COLD NUT FORMERS • COLD HEADERS

MANUFACTURERS, DISTRIBUTORS AND ENGINEERS OF:

COLD HEADERS • ROLL THREADERS • BOLT MACHINERY • COLD NUT FORMERS

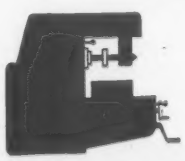
CFM cold forging machines inc.

ELYRIA, OHIO FAirfax 3-3800
100 Washington Ave.

- WIRE WORKING
- WIRE NETTING
- WIRE MESH
- BARBED WIRE
- PAPER PIN
- GEM CLIP
- SLOTTING
- BOBBY Pin
- NAIL MAKING
- WOOD SCREW
- WIRE DRAWINGS
- SPRING COILING
- PAPER STAPLE
- WIRE STRAIGHTENING
- TUMBLING BARREL
- WIRE AND TAPE
- NICKEL PLATING
- WIRE STRANDING
- ENAMEL COATING
- TRIMMING

QUALITY WIRE MACHINERY
FOR SALE

Multi-Slide U.S. #33, New 1946, Excellent	684-30
Multi-Slide, U.S. #35, 13" feed, Reeves Drive, New 1951	684-20
Multi-Slide, U.S. #33, New 1946	684-39
Multi-Slide, U.S. #44, 45-50 ton, 43 spm, New 1948	684-43
Multi-Slide, #88 U.S., 100 ton, 45 spm	684-42
Wire Former, #2-18 Baird, 4-slide, 1/8" dia. wire, 18" feed	684-31
Wire Former, #2 Nilson, 4-slide, approx. 18" feed, excellent	684-33
Wire Former, #1 Baird Four Slide	684-53
Wire Former, #3 Manville Four Slide, 3/16", long feed, older, good	684-46
Four-Slide machine tooled for manufacture of hog rings	684-01
Wire Coat Hanger Machine, complete with paint unit	684-28
Spring Coiler, No. 12A Torrington, 1½ years old, practically new	684-44
Spring Wire Coilers, W-125 Torrington Segment Type, .080 to .207"	684-56
Spring Coiler, W-20 Torrington Clutch Type, Ser. 35919	684-16
Spring Coiler, Rectangular #0 size, Custom built	684-07
Spring Coiler, #0 Sleeper & Hartley Torsion, New approx. 1945	684-37
Spring Coiler, #1 Sleeper & Hartley Universal Segment Type	684-05
Spring Coiler, W-3001 Torrington Torsion, New	684-12
Hodge Straight Roll Wire Drawer, 14 pass, complete	684-52
Wire Straightener & Cutoff, 5/16" x 12' Lewis 2CV (latest) 1958	684-51
Wire Straightener, No. 6C Lewis, 5/16"	684-50
Wire Straightener & Cutoff, Lewis #1C, 1/16 - 1/8", 8' length	684-25
Wire Straightener, ¼" ADT, 5 HP	684-32
Wire Straightener & Cutoff, Lewis #2C, ¾" x 6', Excellent	684-19
Wire Straightener & Cutoff, 10' 5/16"	684-21
Wire Flattening Mill, 4" x 2", 10 stand tandem, Waterbury Farrel	684-11
Descaler, Mechanica, .031 - .375 gauge rod, New '56, Excellent	684-14
Wire Pointer, 1¼" to 6" capacity, Budgens Auto., New '59, .020 to .051	684-03
Chain link fence weaving machine, Blashill, New '54, Exc.	684-22
Knitting machines, Sinfra, for braiding cotton wire	684-23
Braiders, 4" gear and 6" gear Textile Machine Works	684-24
Fence Machine, Chain link Wafios (3), 12', 10' and 6' capacities	684-29



GAVLICK
MACHINERY CORPORATION
BRIDGEPORT 1, CONN.
FOrest 7-4444

36 CRADLE PLANETARY CABLING MACHINE

It is equipped with shaftless, fast loading cradles, with means for locking reels in place and eliminating side slap.

Operating speeds from 70 to 105 R.P.M. Power can be supplied either by an induction motor, Warner clutch, and Vee belt drive, or a wound rotor motor, resistors, and Vee belt drive.

This Machine accommodates reels 10 Inches Diameter, 10 Inches Overall Width.

Filling Head for 18 packages, 8 inches diameter—8 inches traverse, equipped with adjustable friction devices.

Binding Head accommodates six yarn packages 6 inches diameter, 4 inch traverse and is driven through a clutch, counter shaft and variable speed device.

The Eccentric Taping Head accommodates 4 pads 18 inches in diameter, 2 inches in width, and is driven through a clutch, counter shaft, and variable speed device. Tape pads equipped with constant tension devices.

Capstans are dual 4 groove 30 inches diameter, driven through change gears.

This Planetary Cabling Machine is one of a number which we have built handling reels 8, 10, 12, 16, 19, 24, or 30 inches in diameter. We can supply Standard units to meet practically all requirements.

WRITE, WIRE, OR PHONE FOR FURTHER INFORMATION.

THE EDMANDS CO. 860 WELLINGTON AVE. CRANSTON 10, R.I.

2 COMPANIES

Supplying the needs of the wire industry in the West

First, there's Western Wire & Textile Machinery, Inc., the only company in the West that deals exclusively in used and reconditioned wire and cable-making equipment.

Secondly, there's the Paul I. Kenner Co., supplier and distributor of new wire and cable manufacturing machinery and supplies.

Nowhere else in the West will you have a better chance of finding exactly what you need - - - either new or used. Nowhere else in the West will you be able to trade in old equipment on new. Nowhere in the West will you find such a complete stock of machinery, equipment and supplies.

You'll like dealing with men who speak your business language - - - with companies backed by 20 years of highly specialized experience.

SOME USED EQUIPMENT ON HAND:

Braiders, Taping Machines, Used Watson and N.E. Butt Bunchers, 7 & 19 Bobbin Tubular Stranders, Used Syncro 61 Bobbin Planetary Strander.

EQUIPMENT

Enameling Equipment — Extruders
Takeup Equipment — Payoff Equipment
Spoolers — Respoolers
Measuring Machines — Capstans
Cable Strippers — Braiding Equipment
Twinners, Stranders, Cablers, Bunchers
Spark Testers — Printing Machines
Spiral Striping Machinery — Taping Equipment
Fine Wire Takeup and Respooling Equipment
Wire Drawing Machines
Specially Built Equipment . And Much More

SUPPLIES

Wire Drawing Dies — Wire Drawing Spools
All Types of Reels and Spools
Lithographed Spools
Inks for Printing Machines
Bare, Tinned and Silver Plated Copper Wire
Numerous Other Items

TRADE YOUR OLD EQUIPMENT FOR NEW

WWT Clevann Machinery, Inc.

WESTERN WIRE & TEXTILE MACHINERY, INC.
228 Shaw Road South San Francisco, Calif.

PAUL I. KENNER Company
228 Shaw Rd., So. San Francisco, Calif.

Two companies that provide all that's needed, new and used for the West's wire industry

Observations Upon Production Planning and Control in a Steel Wire Mill

(*Continued from page* 890)

and how it is put to use. Anyone who belives that he is compiling useless information will very soon become slack and bored, producing very inaccurate information. Overloading also produces erratic results and inefficient working disproportionate to the amount of overload.

d. Personnel employed in the department must have imagination, interest in the work, and thick skins. It is quite impossible to produce the answer which delights everyone. It is only by attention to detail, combined with an overall appreciation of the picture, that useful work is done. It is the 5% small proportion of out of flow work that must be battled with, whilst the 95% majority on the rails continues to go smoothly through the works.

e. To pay for a comprehensive system of production planning and progressing of work, and then fail to reap the full benefit of the work done, due to shortage of clerical man hours, is surely quite as wasteful to the company's economy as to put in a valuable machine and let it be idle due to shortage of raw material. But the sight of a valuable machine waiting for work is very tangible and matter of fact, resulting in quick observation and appreciation of the facts; whereas the nebulous assertion that the reason for delivery delays, or accurate information about future deliveries, is available if only sufficient clerical time could be found to pull it out, does not meet with the same quick appreciation of the problem, nor eagerness to remedy it. Surely, this is in itself a planning problem which would be solved more easily if the planners would take a few steps back, and look afresh from time to time. If the subject is given attention in the same way that economical loading of plant and machines receive, then it will become obvious that "thinking time" is just as valuable a commodity for planning and progress staff, as for higher management.

f. The information obtained during the course of normal working of the progress office is of great value to the commercial side of the company. Provided that such information is always considered in its true context, the work of the costing section becomes more realistic, and changes in plant or methods of production are quickly reflected in the costing records. To achieve good results in this direction, it is imperative that a very close liaison is maintained between the production manager and the commerical section of the company, particularly concerning new projects.

* * *

It is the purpose of this paper to show that a simple system of planning and progressing work in a steel wire mill can provide information which assists various sections of the company to be efficient units.

Future Annual Conventions Scheduled for THE WIRE ASSOCIATION

October 22-25, 1961

Annual Convention of the Association at the French Lick-Sheraton Hotel, French Lick, Ind.

This will be a meeting of unusual interest. Besides an excellent series of technical papers for all divisions, there will be plenty of time for recreational activities at this fine resort hotel. Plan to come to enjoy yourself as well as to get new ideas on products and processing.

October 22-25, 1962

Annual Convention of the Association at the Lord Baltimore Hotel in Baltimore, Maryland. Plant visits to Bethlehem Steel Company's Rod & Wire Mills at Sparrows Point and to Western Electric Company's Point Breeze Works are scheduled.

Note these dates on your calendar for future reference.

THE WIRE ASSOCIATION

RICHARD E. BROWN
Executive Secretary

---

453 Main Street, Stamford, Conn.
DAvis 3-0482

It draws attention to the wide scope for extracting facts from the system which can be used for a variety of purposes. An attempt is also made to show that too much emphasis on the mechanics of working the system, to the detriment of evaluating the information obtained from it, is often a serious fault, not easily recognised and corrected. It is felt that the introduction of fewer items of plant and machinery, each capable of increased outputs, makes imperative the need for efficient planning and progressing of work, so that idle time of highly paid men and valuable machinery is cut to an absolute minimum. Thus the customer, the company, and the employees should be able to share the resultant financial saving.

Sylvania Dedicates and Opens New Weld Plant

(*Continued from page* 891)

is flattened from the three types of wire listed above. Wire and ribbon production is carried on in the modern one-floor wire plant on Lexington Ave. in Warren, which has a total floor space of 71,235 square feet, and is operated under the direction of **J. Marshall Smith**, Wire Plant Manager.

* * *

The wire plant is a model of good layout, good housekeeping and efficient production. Provided with the most modern equipment for drawing, heat treating, plating, straightening and cutting, and auxiliary equipment, the plant is designed

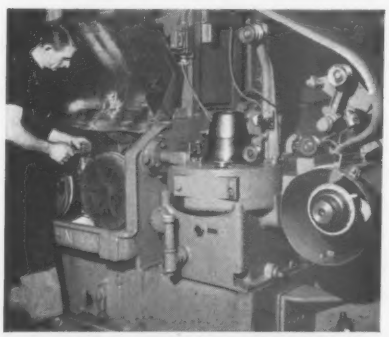


Fig. 2—One of several fine wire multiple drawing machines in use at the Wire Plant of the Parts Division of Sylvania Electric Products. Plated, clad, alloy and nickel wire can be drawn down to .020 inches on this equipment. The operator of the wire drawing machine is shown above checking the wire for proper tolerances as it leaves the last die. * * *

need a lubricant for lots of F.P.M.?

FLEXIMET M2DS*

Here's a rich, fused di- and monometallic stearate that's especially compounded for tough drawing jobs like mechanically descaled rods or drawing high manganese steels. After descaling mill operators report excellent die life. Permits multiple drafting speeds up to 2000 F.P.M. For use directly in die box to produce a dry, hard semi-glossy to bright finish.

WRITE SWIFT FOR BULLETIN 45 and details on other FLEXIMET products

* *A metallic complex lubricant Containing an additive to promote bond where no precoat is used.*

SWIFT & COMPANY
SOAP DEPARTMENT
4115 Packers Ave., Chicago 9, Illinois

S-77

Swift
METALLIC COMPLEXES

106TH YEAR

Take the hands out of handling

SAVE TIME, REDUCE COSTS

Special tilting racks at Flexible Steel Lacing Co. feed parts automatically from Hopper End Boxes onto assembly table.

REPUBLIC HOPPER END BOXES

Whether you're sorting, sizing, counting, assembling, or packing—you can eliminate costly, repetitive manual handling with Republic Hopper End Boxes. Pallet-truck portable, boxes travel with the parts through each stage of production. Hopper ends permit gravity unloading . . . safe stacking saves floor space.

Whether you're working with wire by the mile, or making miniature springs, the big line of Republic Material Handling Equipment can provide the exact units you need to save time, money, and labor. Ask your Republic representative for specific help, or mail the coupon for complete literature.

REPUBLIC STEEL

Strong
Modern
Dependable

Steel

REPUBLIC STEEL CORPORATION
BERGER DIVISION • DEPT. A-2535
1144 BELDEN AVENUE • CANTON 5, OHIO

Please send literature on:
☐ Republic Material Handling Equipment
☐ Republic Hopper End Boxes

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

to handle small special orders or long runs on large orders.

* * *

Some of the major users of fine wire are: the receiving tube industry for grid side rod and lateral wire, the heart of the receiving tube; the lamp industry for electrical connections and support wire for filaments in incandescent lamps and electrical connections for fluorescent lamps; the semiconductor industry for diodes, transistors and insulators; the aircraft industry for high temperature electrical conductors; the paper making industry for wire cloth and belts (wire woven into mesh for filtering purposes) on paper making machines. Ribbon is used primarily by the electronics industry for electrical contacts and connectors.

* * *

Since 1959, the division has been engaged in extensive development work in custom applications of wire as a high temperature conductor. One result of this work was the recent development by Sylvania of nickel clad silver 20 per cent wire that has excellent electrical conductivity and at the same time can withstand corrosive atmospheres and temperatures up to 1500 degrees F.

* * *

Sylvania's sales of fine wire have increased annually since the division was formed in 1950. In the last six years, wire sales have increased over 50 per cent.

* * *

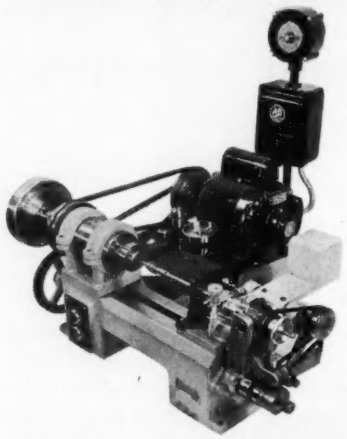
Following the dedication and opening of the Weld Plant, the Parts Division's guests were conducted through this plant and the adjoining ones, where the manufacture of wire, lamp and tube bases, and plastics injection and compression molded products, and other operations were observed.

New Seco Heavy-Duty Recoiler

A new SECO recoiler for slitting or coil-processing lines, announced by **Steel Equipment Company**, 20805 Aurora Rd., Cleveland 22, Ohio, provides automatic speed adjustment to maintain

NOW You Can DOUBLE

Your finished tungsten carbide die production



with the new type "M"

DYKREX

Automatic Polisher!

Check these important advantages!

ONE OPERATION

- NO CHANGING of DIE, from 'rough' polishing to finished die
- VARIOUS Base Lengths — 24" to 36" long
- Made in 2 Sizes — Capacity from 1 inch to 6 inch Die Castings
  Largest Capacity — up to 7½" Die Castings
- PUSH BUTTON CONTROL — Semi-Automatic type with Time Switch or
  Automatic type — Just Dial the Speed!

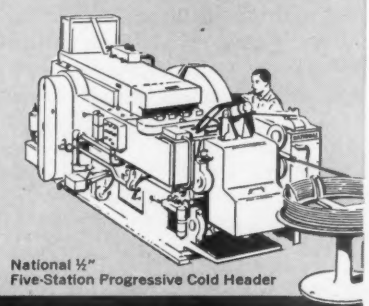
Send for Literature and Prices

DYKREX
CORPORATION
NEWARK 4, N. J.
Factory • 17-19 Grove St.
Montclair, N. J.
Phone Pilgrim 4-1500

These important parts are cold-formed from wire, start to finish in compact, efficient National Cold Headers.

Practically scrapless, all these parts achieve remarkable savings over past methods.

If you make odd-shaped parts, may we help you evaluate them for cold-forming from wire? Better yet, come to Tiffin, witness our demonstrations and let's discuss your work.



National ½" Five-Station Progressive Cold Header

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U. S. A.

HARTFORD DETROIT CHICAGO

constant strip speed required by the slitter or processing line. The variable-speed 100-hp D.C. drive motor is regulated by a tachometer generator signal roll on the moving strip.

* * *

The block is mounted on the output shaft of the gear reducer drive which is completely enclosed in a special housing. The output shaft rotates in antifriction bearings, spaced for maximum rigidity and stability. A separate motor-driven gear pump provides continuous forced feed lubrication to the gearing, assuring adequate lubrication. Output shaft is proportioned for the heavy overhung load of a 40,000 lb. coil. Maximum coil width is 54-inches.

* * *

A built-in, bottom-mounted hydraulic coil pusher removes the coils from the automatic hydraulic block. A suitable coil car with hydraulic lift (floor or pit mounted) is usually furnished by SECO for removal of recoiled strip.

Erratum

In our June issue on page 772, for the Medal Award winner for 1960, **Gilbert D. Dill,** the printer inserted the picture of another gentleman, **Hugh MacKellar** of Whitney Blake Company, instead of the one of Mr. Dill.

* * *

The photograph of Mr. Dill, shown here, is the one ordered to be run. Our apologies to both Mr. Dill and Mr. MacKellar.

Gilbert D. Dill

Six *advantages from just* One *dip!*

and ONE DIP *is all that is necessary for coating wire and steel rods...*

good acid neutralizing

faster butt welding

better working conditions

longer storage with safety

rust inhibitor coating

longer die life

you get them all with

BORAX 5 MOL.

BORAX 5 MOL offers worthwhile advantages over regular borax as a satisfactory coating material on ferrous rods and wire in preparation for dry drawing. This newer material offers a higher concentration of sodium borate and therefore savings may be realized through reduced transportation, handling, and storage costs. Only about three-fourths as much Borax 5 Mol need be used to equal regular borax... yet you get the same worthwhile results!

Write to our Technical Department for further information

U.S. BORAX

50 Rockefeller Plaza, New York 20, N. Y.
630 Shatto Place, Los Angeles 5, Calif.

Bulletin on Sunbeam Furnaces

The Vol. 20, No. 1 issue of Sunbeam Metal Minutes contains information on a number of Sunbeam Furnaces. The lead article describes a continuous conveyor furnace recently installed by Illinois Iron & Bolt Co. to replace a batch type rotary furnace.

* * *

Other furnaces illustrated and described are an electrically heated elevator type oven furnace for annealing chrome nickel stainless steel wire, bell type furnace for wire and strip, galvanizing furnace for fencing and roller hearth furnace for wire coils.

* * *

Copies of this Bulletin may be secured by writing **Sunbeam Equipment Corp.**, 190 Mercer St., Meadville, Pa.

TWO IMPORTANT ACCESSORIES
to improve operating efficiency

ACROLOK

A simple and effective locking device for holding spools or reels on ⅜", 1", 1¼" and 1½" spindles. Merely press—it locks: lift the lip and it slips off. No screws or springs to fiddle with. Holds spool tight—can't shake loose.

ACROPAK SHEAVES

Rolled aluminum, precision made. Available in plain or interlocking type (as shown) with or without bearings, retainers, precision spacers and hard coating. Standard sizes 3" to 14" root diameter.

ACROMETAL PRODUCTS, INC.
616 N. Fifth Street., Minneapolis, Minnesota

★ **SIRKOTE NO. 60** ★

A PRODUCTION-PROVEN ZINC PHOSPHATE COATING

SIRKOTE No. 60, for low, high carbon and alloy rod and wire can be used for dry or wet drawing, for cold heading, for cold extrusion and other operations.

SIRKOTE NO. 60 IS A STAR PERFORMER
Get the data on this fine coating today.

CIRCLE CHEMICAL COMPANY
333 N. MICHIGAN AVE. CHICAGO 1, ILLINOIS
FINE CHEMICAL SPECIALTIES FOR INDUSTRY

ENJACO

100 GLEN ROAD
CRANSTON 10, R.I.

JAMES L. ENTWISTLE
PRESIDENT

THE SYMBOL OF EXCELLENCE IN WIRE
PROCESSING AND TESTING EQUIPMENT

New Round-Cornered Hexagon Rod

Scovill Manufacturing Company, Waterbury, Conn., now is producing and selling its new Round-Cornered Hexagon Screw Machine Rod in the same range of sizes as present standard Hex rod at no increase in price.

* * *

Alloys available in this new round-cornered form are Scovill's "High-Speed" Free-cutting Brass (regular temper), Commercial Bronze, and Naval Brass.

* * *

Many advantages are cited for this improved rod form. There is a direct saving of ½ of 1% in weight of metal for a given length of rod, a considerable item on long runs. The rounded corners, having a radius approximately 10% of the dimension across the flats, are less subject to nicking and burring in handling, hence will feed more smoothly into screw machines, with reduced wear and possible damage to feed fingers, collets, and tools. It is possible, in some cases, to use a larger size of the round-cornered hex rod in screw machines of given capacity.

* * *

Users of the round-cornered rod, which has been under development at Scovill for two years past, report maximum output with less downtime, superior quality and appearance in the finished products. No changes in machines or tools are required to handle the Round-Cornered Hex Rod.

* * *

Further information is available on request from Scovill Mfg. Co., Waterbury 20, Conn.

Chrome Plating Anodes

Anodes for high speed chrome plating employing the new HS-32 lead alloy developed by **Heil Process Equipment** engineers specially for use with the new high speed fluoride-ion chrome plating solutions. Tested and approved by manufacturers of high speed fluoride-ion chrome plating solutions. Complete description

including prices of four diameters and 30 standard lengths. Write Heil Process Equipment Corporation, 12850 Elmwood Ave., Cleveland 11, Ohio, for a copy of Bulletin No. B-4660.

New Service Designed to Break Cost Barriers

A comprehensive new service, designed to pinpoint and remove all unnecessary costs in the manufacture of both industrial and consumer products, is described as a "unique and sound approach to the problem of rising material, engineering, and production costs."

* * *

The new service, called Product Evaluation, was announced by **J. K. Fowlkes,** President of **Value Analysis, Inc.,** 6 E. 45th St., New York 17, N. Y., a nationwide organization of value consultants providing industry with Value Analysis training seminars and management guidance programs aimed at both preventing and eliminating unnecessary costs.

Olin Brand Name Changed

A trade name prominent in the metal industry for 45 years — Western Brass — is being changed in the interests of simplicity, uniformity and closer identification with **Olin Mathieson Chemical Corporation,** which makes the brass.

* * *

The new name is Olin Brass. The products, customer services and sales policies associated with Western Brass for decades will not be affected, but packaging materials, stationery, invoices, displays, signs and all other graphic forms of identification will be replaced in an orderly transition to the Olin Brass name.

* * *

The change is in line with the corporation's recently-announced identity program adopting the short two-syllable signature "Olin" for everyday use in preference to the full 12-syllable legal title. By putting "Olin" on most of its product groups, including metals, packaging and chemicals, the company hopes to eliminate as much as possible any confusion caused by an earlier excess of brand names and trademarks.

Miniaturized Wire Stripping

New, perfected machinery designed by **Manger Electric Company** permits them to perform miniaturized, custom wire stripping service. Any stranded or solid wire as fine as AWG No. 36, with most types of extruded insulation including Teflon, can be stripped with 1/16" minimum each end, leaving as little as ½" insulation length. These short jumper wires have a tolerance of ±1/64" for stripping and overall length, and are free of nicks and frayed ends.

* * *

For further information, write **J. M. Judge,** Sales Mgr., Manger Electric Co., Inc., Miller St., Stamford, Conn., or phone FIreside 8-7761.

MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .250"
45 sizes Bright Tinned, .005 to .125"
Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire,
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000
in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.
Dental and Surgical Wires, large assortment.

THE MALIN & COMPANY

2514 Vestry Ave. Established in 1884 Cleveland 13, Ohio

WIRE DRAWING MACHINERY
AND EQUIPMENT

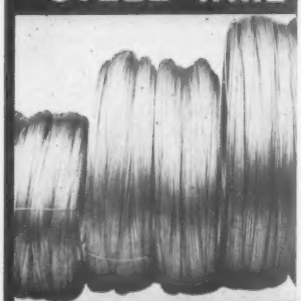
FINE WIRE MACHINES • SPOOLERS • POINTERS
PATENTING, TEMPERING, GALVANIZING AND TINNING EQUIPMENT FOR WIRE
Wire Blocks Made To Suit Your Needs

WRITE FOR PRICES

SUPERIOR TOOL & MANUFACTURING CO.

SHREWSBURY STREET WEST BOYLSTON, MASS.

STAINLESS STEEL WIRE



Holds World's record for Productivity & Export

NAS

STAINLESS STEEL WIRE

Dia: 0.625"~0.0016"

Capacity: 350 tons(monthly)

NIPPON STAINLESS STEEL WIRE MFG. CO., LTD.
HEAD OFFICE: NO.47, UMEDA-CHO, KITA-KU, OSAKA, JAPAN.

Steel Packaging & Marking Procedures for Mill Products

A revision, requested by the **American Iron and Steel Institute,** of preferred methods for packaging, marking and loading for steel mill products for domestic shipment has been circulated for trade approval.

* * *

The Commerce Department said the recommended revision of Simplified Practice Recommendation R247-52 also included definitions of trade terminology for packaging and loading terms used in the steel industry.

* * *

A limited number of copies of the recommendation is available from the Commodity Standards Division, U. S. Commerce Department, Washington 25, D. C.

New Line of Clamps Announced

United Associates, 1605 N. Hercules Ave., Clearwater, Florida, announces the availability of a new product catalog describing in detail the new line of high tensile strength aluminum threadless-spindle clamps recently developed by **United Clamp Mfg. Co.,** division of United Screw Machine Products.

* * *

The catalog gives a description of the three types of clamps developed to date; the standard frame, the welding, and the deep-throat line of United Clamps. In addition, it gives complete range of sizes, prices, shipping information, the range of spindle types and materials, and accessories that are currently available.

Bulletin on Zinc Coating

The Carboline Company of St. Louis has released a new, four page illustrated bulletin on Carbo Zinc 11, inorganic zinc coating.

* * *

The bulletin describes the galvanic principle of inorganic zinc protection, both in immersion and non-immersion service.

* * *

Portions of the bulletin are devoted to a discussion of Carbo Zinc 11 with or without topcoats, as a tank lining, and as a high temperature coating. Physical properties and application advantages are included.

* * *

Copies of Bulletin 400, Carbo Zinc 11 are available by writing to Carboline Company, 32 Hanley Industrial Court, St. Louis 17, Mo.

The Copper Outlook

World copper consumers are faced with a paradoxical situation — a rising price trend at a time when production is running in excess of consumption. Moreover, world producers are carrying substantial stocks of unsold copper, stated **Dr. Joseph Zimmerman,** Vice President of **Miles Metal Corporation,** in an address before the 39th Annual Meeting of the **Copper & Brass Research Association.**

* * *

From a statistical point of view, the copper market should not be as strong as it is. How-

DIES and NOZZLES for
INSULATING ELECTRIC WIRE
STEEL and CARBIDE

CENTRAL CARBIDE NOZZLES OR TIPS have extremely long life and cut costs.

Our STEEL DIES are made Round, Figure 8, Serrated, Tracer—or in special shapes.

Highest quality of workmanship and materials. Semi-Finished Standard dies and TIPS in stock. Special shapes to specification.
WIRE TOOL DIVISION
CENTRAL TOOL AND MACHINE CO.
102 CENTRAL AVENUE, BRIDGEPORT 7, CONN. TEL.: FOREST 7-8473

THE MONTGOMERY COMPANY
EST. 1871
WINDSOR LOCKS, CONNECTICUT
NATIONAL 3-3336
M
Quality
FLAT WIRE
FOR SHIELDING • BRAIDING • FLAT CONDUCTORS FOR RIBBON TYPE FLEXIBLE CABLES • RADIATION DETECTORS AND TUNING DEVICES • CABLE DRAIN WIRE. ALSO OTHER ELECTRONIC USES.
FOR PROMPT DELIVERY
WRITE-WIRE OR PHONE

STANDARD

MOLDED WIRE BRAIDER SPOOLS
SMOOTH SPOOL HEADS will not break, warp, knick or rough-up—reducing maintenance costs. The instant locking feature saves time locating "dog-hole". Lighter than metal spools with less wear on Braider and Winder.
Contact us regarding your Spool Problems.
Stocked and sold exclusively by
STANDARD MILL SUPPLY COMPANY
31 ESTEN AVE., PAWTUCKET, R.I.
Telephone, PAwtucket 3-1534

ever, other factors have intervened to offset the present imbalance between supply and demand.

* * *

Dr. Zimmerman pointed out that copper, being an international commodity, is influenced by such things as the unsettled conditions in the Congo and the political and social unrest in South Africa. Katanga in the Congo, and Northern Rhodesia, which borders South Africa, account for about 25% of the Free World's copper output. Consumers outside the U. S. depend on that 25% for their copper supply.

* * *

Also affecting the copper market outlook is the possibility of strikes at Kennecott's U. S. properties at the end of June and at Anaconda's El Salvador and Potrerillos mines in Chile at the end of July.

* * *

Other developments that have sparked the copper market and pushed prices upward, he declared, are good business abroad, an improvement in the domestic copper and brass fabricating industries, and an exceptionally good demand from Japan. Buying thus far has been orderly rather than panicky, at home and abroad, he added.

* * *

While there is every indication of a further uptrend in the price, continued Dr. Zimmerman, no runaway market such as prevailed in 1955 and 1956 is likely.

New Rotary Offset Printer

Jas. H. Matthews & Co., Pittsburgh, Pa., announces a new marking unit designated Model L-6015 Rotary "In-Line" Offset Printer — for identifying pipe, tubing, bar stock and similar ferrous and non-ferrous products.

* * *

Installed over a production line, the unit may be friction or power driven at any line speeds. It is of heavy duty construction for rugged industrial use. Trademarks, product identification data or any other wording may be printed at desired intervals on lengths of pipe or other products.

* * *

Products of any diameter, flat and most shapes, can be imprinted with the new offset printing unit. It is easy to install over existing production lines, and requires a space of approximately 2 ft. x 1 ft. for mounting.

* * *

The company's Bulletin A477 illustrates and describes the new unit in detail. A copy may be secured by writing to Jas. H. Matthews & Co., Pittsburgh 13, Pa.

OUR ADVERTISERS ARE RELIABLE PATRONIZE THEM

NEBUTTCO

MACHINERY FOR HIGH SPEED PRODUCTION

- BRAIDERS
- CABLERS
- TAKE-UPS
- BUNCHERS
- STRANDERS
- TAPING MACHINES

NEW ENGLAND BUTT CO.
Division Wanskuck Company
304 Pearl Street · Providence 7, R. I.
James Day (Machinery) Ltd. • 28 Maddox Street, London W1, England

Manufacturers and Engineers of Dispensable Packaging Items

MERRIMAC SPOOL & REEL CO. Inc.

- PAPER SPOOLS
- PAPER TUBES
- PLASTIC SPOOLS
- CORRUGATED REELS
- METAL & CUSTOM MADE SPOOLS

ANTRIM REEL, INC.

• WOODEN REELS • PLYWOOD REELS • WOODEN PRODUCTS

GENERAL OFFICES:
551 RIVER ST., HAVERHILL, MASS. Tel: DRake 2-7777

WE BUY WE SELL

30" Dual Entwistle Take-up Stands
Wardwell Braiders, 16 Carrier
Syncro, Type BB-13, Fine Wire Drawing Machines, Complete.
Syncro, Type C, Intermediate Wire Drawing Machine, Complete.
3 Sleeper-Hartley BX Armoring Machines, Complete
2 — 24" New England Butt Bunching Machines, Complete
Many Other Items

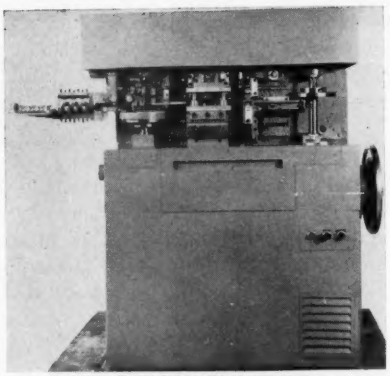
WIRE & TEXTILE MACHINERY INC.
P. O. BOX 436, PAWTUCKET, R. I.

New Small Verti-Slide For High-Speed Wire Forming

The new V-80 vertical metal-processing machine announced by **The Torrington Manufacturing Company,** Torrington, Conn., is designed specifically for high-speed, precision production of small wire and strip components with unusually low set-up time. A smaller version of Torrington's V-82 and V-81 vertical four-slide machines, the V-80 retains the advantages of superior versatility, visibility and accessibility to press and forming tools. Because of the modular design of Verti-Slide subassemblies, the machine can be adapted to add welding, tapping, swaging, thread-rolling and other secondary operations automatically within or parallel to the primary forming cycle.

* * *

The V-80 stock capacity is 3/4 in. maximum strip width, .032 in. maximum strip thickness, and 1/16 in. maximum wire diameter. Production rates are from 100 to 500 strokes/min with standard rise cams, and 100 to 350 strokes/min with either maximum rise cams or feed lengths near the maximum (3 in. for strip; 5 in. for wire). An electrical brake, used in jogging for quicker set ups, is standard equipment on the V-80.



V-80 Verti-Slide Wire Former

* * *

The V-80 Verti-Slide machine weighs 2000 lbs., is 66 in. long, 25 in. wide, and 60½ in. high.

* * *

Further information on the new V-80 metal-processing machine may be obtained by writing Machine Division, The Torrington Manufacturing Company, Torrington, Conn.

New Bulletin on High-Voltage Testing

A complete engineering application analysis, titled . ."High-Voltage Testing: It Can Be Non-destructive" has been prepared by **Harold N. Miller,** vice-president and chief engineer of **Associated Research, Inc.**

* * *

This bulletin details the causes of insulation breakdown, the minimizing of destructiveness by current limiting and many other pertinent aspects of insulation testing.

* * *

A copy of this Bulletin 5-15.4 may be secured from Associated Research, Inc., 3777 W. Belmont Avenue, Chicago 18, Ill.

EST. 1855 AIMCO INC. 1915
"American" INSULATING MACHINERY COMPANY
TRADE MARK
FAIRHILL AND HUNTINGDON STREETS
PHILADELPHIA 33 PENNSYLVANIA U.S.A.
MANUFACTURERS OF WIRE INSULATING MACHINERY AND ALLIED EQUIPMENT. MACHINERY MFG. TO CUSTOMERS SPECIFICATIONS.

- DRUM TAKE-UPS
- SPOOLING EQUIPMENT
- WIRE ENAMELING MACHINERY
- INSULATING MACHINERY FOR GLASS, COTTON
- TAKE-UPS AND PAY-OFFS
- TAPING MACHINES
- SPECIAL MACHINERY

WITHSTANDS HI-SPEED PRESSURE OF SYNTHETIC YARNS AND WIRE WITHOUT WEAR OR DAMAGE

HEANIUM®

GROOVED EYELET
EG-680

HEANY INDUSTRIAL CERAMIC CORP.
P. O. BOX 530 NEW HAVEN 3, CONNECTICUT

FORMULA FOR SUCCESS
IN SYNTHETIC THREAD AND YARN APPLICATION

SYNTHETIC THREAD COMPANY (YARNS+PROCESS+SERVICE)=$UCCESS∞

NYLON
FORTISAN
ORLON
RAYON
DACRON
DACRON/GLASS
ACETATE

EXACT CONSISTENT to GOV'T SPEC.

OUR PROUDEST ASSET
ALL PUT-UPS STANDARD OR SPECIAL

IN APPLICATION
BRAIDING • SERVING • IDENTIFICATION • BINDING • LACING • HI-STRENGTH FILLER

Write for Samples, Prices and Data desired

SYNTHETIC THREAD CO.
238 W. GOEPP ST., BETHLEHEM, PA. Tel.: UNiversity 8-8575

Selling EXCLUSIVELY to MANUFACTURERS and WHOLESALERS

Manufacturers and insulators of Television 300 Ohm Wire — Any size reels . . . all types and mil thicknesses — Insulators — S.P.T. — Zip Cord — Lamp Cord — Stripping and Cutting Short or Long Lengths of Insulated Wires — Hanking-Coiling any length Wire — Florist Soft Annealed Steel Wire on ½ lb. Florist Spools or any size spool — Spooling of Wire — Silver Solder

PLUS

Many Other Services Including

- Attaching terminals to short or long leads of insulated wire
- Complete battery of attaching terminal machines
- Cutting short lengths of any bare wire and straightening
- Open capacity

JERSEY SPECIALTY CO., INC.
Burgess Place
Wayne, New Jersey
Telephones: OX 4-6200-1-2-3

VHF J.S.C. VHF

Extruded Cellular Vinyl

(*Continued from page* 864)

varying densities and physical properties can be formulated. Conventional processing equipment can be used for their fabrication.

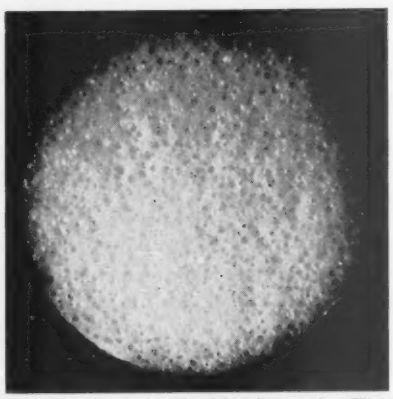


Fig. 3D — 80 parts plasticizer/100 resin. Shore A-50.

The technology of extruded cellular vinyl for wire and cable is in its infancy and there is much to be learned about its application. Since cellular vinyls have the inherent properties of solid vinyls plus the added advantage of lower specific gravity and better electrical properties, they can be used to advantage for many wire and cable applications.

* * *

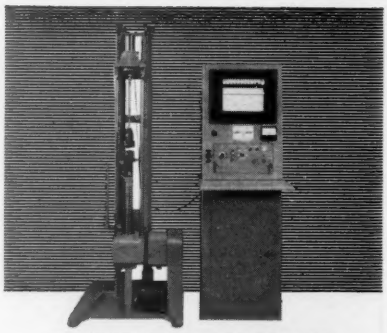
It is conceivable that cable jackets used primarily for color coding can be made satisfactorily with cellular vinyls. A jacket whose function is to merely contain a cable core can be cellular

Fig. 3E — 100 parts plasticizer/100 resin. Shore A-45.

vinyl. If chemical protection is the only function of a cable jacket, it can be cellular vinyl. Why not use cellular vinyls as primary insulations or jackets if the performance characteristics required are realized? When a cable jacket is used, as protection against damage which might be caused to a cable core by the subsequent application of armoring wire or metallic tapes, it can be cellular vinyl.

* * *

If performance requirements for any wire and cable application can be met by using cellular vinyl instead of solid vinyls, they should be used. By using cellular vinyls instead of solid vinyls, the cost will be reduced and so will the weight of the finished cable.



TENSILE TEST CAPACITIES TO 2000 LBS.

Scott Model J-5 Tester with ACCR-O-METER Electronic Weighing gives you a far greater range of quality evaluation for wire, insulation sheath, and cable components — and at modest cost! ACCR-O-METER strain gage weighing features *interchangeable* force dividers . . . provides for full scale test capacities of .5 to 2000 lbs. Push-button testing for both high and low elongation materials. Stress-strain information "picturized" on strip chart. Ample magnification for detailed test analyses. For top testing convenience, economy, versatility . . . get facts on ACCR-O-METER. **Scott Testers, Inc., 55 Blackstone St., Providence, R. I. Tel: DExter 1-5650 (Area Code 401).**

SCOTT TESTERS
THE SURE TEST . . . SCOTT!

REFERENCES

1. W. T. Higgins, SPE Journal 11, 52 January, 1955.
2. Underwriters' Laboratories, Inc. letter to Electrical council of Underwriters' Laboratories, Inc., and manufacturers of Labeled Nonmetallic — Sheathed and Underground Feeder Cable, dated Oct. 18, 1960.
3. H. A. Hill and H. R. Tasman, Modern Plastics Encyclopedia, 38, 1A, September, 1960.

COTTON YARNS
PRECISION WOUND ON WARDWELL TUBES AND NEW ENGLAND BUTT TUBES
WRAPPING AND SERVING YARNS
INSULATING YARNS
UNDERWRITERS' MARKER OR TRACER THREAD
CUSTOM WINDING ANY PACKAGE • ANY NUMBER OF ENDS
CHADWICK YARN COMPANY
P. O. Box 591 — PAWTUCKET, R. I.
PAwtucket 3-0641
Spot lots always in stock

BALLOFFET VIANNEY WIRE DIE CO., Inc.

All sizes from .104" down to .0004" in stock

Manufacturers of Quality diamond dies since 1870

BALLOFFET VIANNEY WIRE DIE CO., Inc.
6825 ADAMS ST. GUTTENBERG N. J.
Tel: Union 3-3393

TO SELL—
Advertise in
WIRE AND WIRE PRODUCTS
IT PAYS—
Send for rates
453 MAIN ST., STAMFORD, CONN.

4. Bulletin No. 4, Celogen AZ, Naugatuck Chemical Div. United States Rubber Co.

5. R. J. Meyer and D. Esarove, Plastics Technology, 4, 5, April, 1959.

6. R. A. Reed, British Plastics, 33, 10, October, 1960.

Waterbury-Farrel Dedicates New Plant

(*Continued from page* 897)

A. Dale Mitchell, president of Waterbury Farrel, pointed out that the new facility is a measure of the confidence of both Textron and Waterbury-Farrel in the expanding requirements of industry for metalworking machinery.

* * *

Waterbury-Farrel manufactures automated cold heading machines. This is the process of cutting wire to length and shaping the cut-off

Fig. 4 — Heavy manufacturing bay of the new WF plant.

slugs into bolts, nuts, screws, rivets, other fasteners and hundreds of other small metal parts. One of the competitive processes to cold heading is screw machining, in which parts are made by cutting from bar stock. In other words, "Cold heading moves the metal, while screw machining removes it."

* * *

The Sendzimir mill is an industry standard for precision cold rolling of stainless steel. It is also used in cold rolling of low carbon steel and its latest adaption is for rolling the new "skinny tinplate" with which the steel industry expects to meet the challenge of aluminum in the container market. It has won wide acceptance for rolling non-ferrous metals. Other Waterbury-Farrel machines include 2 hi and 4 hi rolling mills, wire drawing machines, wire flattening mills, a wide range of multiple plunger presses, and other metal working machinery.

Officers

The President and Treasurer of Waterbury-Farrel is **A. Dale Mitchell,** under whose guidance the new plant was conceived and became a reality. He is a graduate of Trinity College. After a year with General Electric Company, he spent 17 years with a national public accounting firm, following

Diamond Powders
Of First Quality Only
For assured quality, accurately graded diamond powders
Specify
"DANFORTH"

WE BUY SWARF, SLUDGE AND LAPPING COTTON

RECLAIMING SERVICE
We also reclaim and return to you the diamond content, guaranteed 99% pure and graded for further use.

For particulars, write

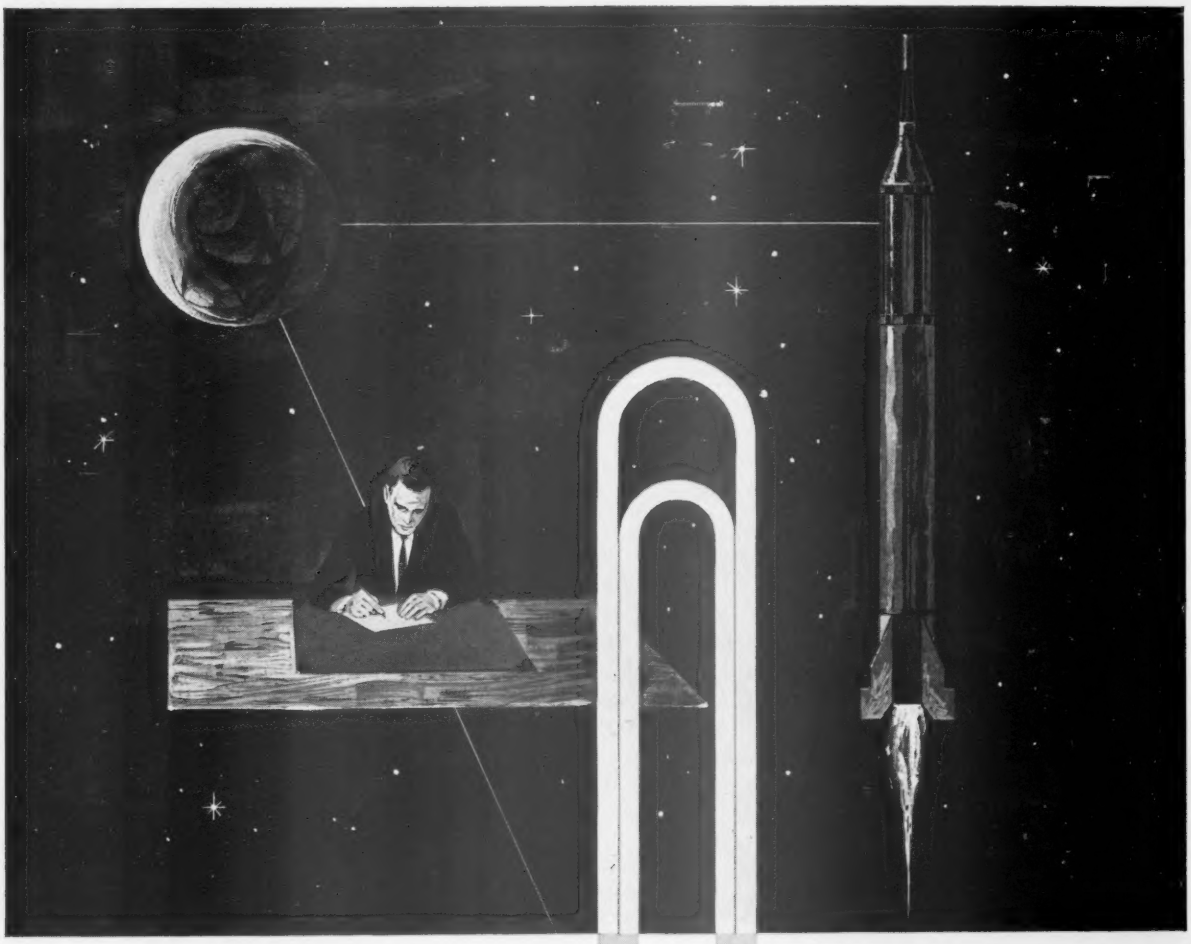
C. W. DANFORTH CO.
101 E. Indianola Avenue
Youngstown 7, Ohio

Established in 1912

WANT GOOD WIRE? THEN USE "THE BEST" DIES!

Only top-quality DIAMONDS are used by WAYNE. This, plus perfection in workmanship, is responsible for the fine reputation of
WAYNE WIRE DRAWING DIES
Satisfactory DIAMOND DIES can only be made by those who have experience, skill and knowledge. WAYNE has all of these. Users have called WAYNE DIES "the best."

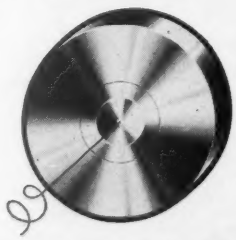
WAYNE WIRE DIE CO.
2 Maple Avenue, Linden, N. J.
Telephone: WAbash 5-2456



From paper clips to outer space

. . . on every desk, and in outer space, wire is a vital link in the function of the simplest business operation or the most sophisticated piece of equipment.

. . . Indiana diamond dies contribute to the most profitable operations of mills where managements eye cost. Indiana not only furnishes the most dependable production dies of finest Brazil diamonds in a unique mount, but also renders its customers a shaping and refinishing service that saves up to 98% of new die costs!



. . . gauges of .0004 to .160 range from a fineness of wire almost invisible to the naked eye, to that of a common paper clip. Whether your requirements are for the most competitively priced, or for the highest reliability wire, Indiana can serve you best. Call us collect. We want to serve you.

ALABAMA WIRE DIE CO.
FAYETTE, ALABAMA

/

INDIANA WIRE DIE CO.
FORT WAYNE, INDIANA

DIAMOND DIES .0006 - .120 DIAMOND POWDER
INDUSTRIAL
AJAX
SUPPLIES INC.
R.R. 4, P.O. Box 66, Fort Wayne, Ind.

CARBIDE NAIL TOOLING
For
Domestic and Foreign Machines
available from STOCK
PITTSBURGH CARBIDE DIE CO.
Monongahela, Penna. BLackburn 8-6959

DIAMOND WIRE DRAWING DIES
DIAMOND POWDER AND COMPOUNDS
DIE RECUTTING SERVICE
CARBIDE DIES • TOOLS • PARTS
RUSCH WIRE DIE CORPORATION
CROTON-ON-HUDSON, N. Y.

NEW ENGLAND WIRE DIE CO.
7 Forsberg St., Worcester, Mass.
EXPERT RECUTTING
DIAMOND DIES, DIAMOND POWDERS
Eastern Representative of
Ajax Industrial Supplies, Inc.

which he joined Waterbury-Farrel in 1942. He became President in 1956.

* * *

Arthur S. Nippes, a graduate of Pennsylvania State College in Mechanical Engineering, entered the employ of the company in 1960 as Vice President — Manufacturing after 20 years of experience in manufacturing with Simons Saw & Steel Co. and the Disston Division of H. K. Porter Co.

* * *

Stephen W. Halloway, Sr., Vice President and General Superintendent, joined the company in 1915 as a draftsman. He became Production Superintendent in 1952 and was elected to his present post in 1958.

DIAMOND WIRE DRAWING DIES
and DIAMOND POWDER
INDIANA WIRE DIE COMPANY
314-324 E. Wallace St., Fort Wayne, Indiana
Phone: Harrison 4373

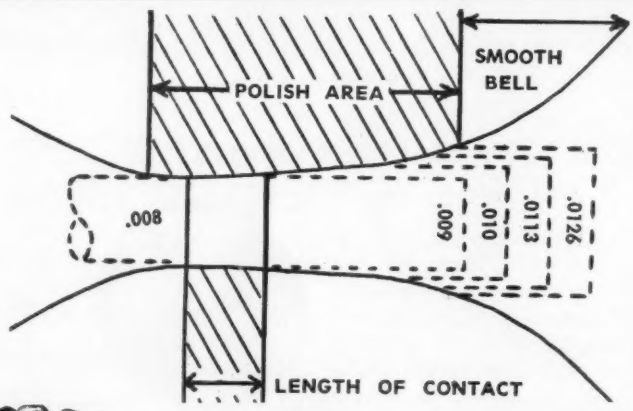
DIAMOND CARBIDE
DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

Reversible MATRIX Diamond Dies
NATIONAL WIRE DIE CO. INC.
12 W. 21st St., New York 10, N. Y. • WA 4-6383

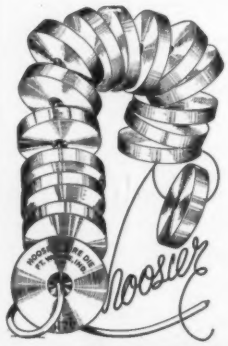
DIAMOND DIES
mounted unmounted
For Precision Wire Drawing
BRENON, INC.
Experts in Fine Size Diamond Dies
R.F.D. #2, Box 400, Edison, N. J.

DIAMOND POWDER
Diamond Reclaiming Services
FORT WAYNE DIAMOND PRODUCTS, INC.
2623 E. Pontiac Fort Wayne 5, Indiana

DIAMOND DIES
PROFILED DIES
FINE SIZE DIES
VICTOR J. BOULIN INC.
10 FIRST STREET, PELHAM, N. Y.



DIAMOND DIES
.0002 to .128
For many years . . .
Outstanding in quality,
workmanship and service.
FORT WAYNE WIRE DIE, INC.
2625 E. Pontiac St., Fort Wayne, Ind.



Our Workmanship is Concentrated
In the "Working Parts" of the Die!

In the manufacture of Hoosier "Drawing Angle Controlled" Dies, we concentrate on the shape, angle and polish of the drawing angle and on the bearing and back relief — the *"working parts"* of the die . . . As a result, you get a die that equals or exceeds your specifications, with enough polish area to make nearly four B&S Gauge reductions of wire!

HOOSIER WIRE DIE, INC.
3233 S. Lafayette St. Fort Wayne, Indiana Phone H-1367

QUALITY
DIAMOND DIES
SKILLED RECUTTING SERVICE • DIAMOND POWDER
ALABAMA WIRE DIE CO.
FAYETTE, ALABAMA
Affiliated with Indiana Wire Die Co.

TUNGSTEN CARBIDE WIRE
DRAWING & COLD HEADING
DIES and CARBIDE TOOLING
EASTERN CARBIDE CORP.
NEW ROCHELLE, N. Y.

The Federal Manufacturing Co.

PLANETARY CABLERS
PAYOFFS-TAKEUPS
CAPSTANS-RESPOOLERS
2-3 WHEEL MEASURING MACHINES
COILING & RIBBON CABLING
PRE HEATERS

TESTERS

DIELECTRIC-HIGH POTENTIAL
AC-DC ELECTRONIC

193 SOUTH CHERRY ST.
WALLINGFORD, CONN.

FOR THE BEST

• CATERPILLAR CAPSTANS • SINGLE AND MULTIPLE HEAD RE-SPOOLERS • TAKE-UP & PAY-OFF STANDS FOR PLATING EQUIPMENT • WIRE STRANDERS

BARTELL MACHINE-TOOL CORP.
YACHT CLUB ROAD ROME, N. Y.

• DESIGNERS • MANUFACTURERS • ENGINEERS • CONSULTANTS

FINE and MEDIUM SIZE WIRE

TAKE-UPS

8, 10 & 12 SPINDLES

COLBOURNE MACHINE COMPANY
21 MUNRO ST. • WINSTED, CONN.

EMORY
SPOOLERS AND TRAVERSES
ROBERT J. EMORY CO.
31 E. RUNYON ST., NEWARK 5, N. J.

DAVIS ELECTRIC CO.
WALLINGFORD, CONN.
SPARKERS — TAKE-UPS
CAPSTANS — PAY-OFFS
SPOOLERS — TRAVERSES
TEFLON EXTRUDER

REELS

Wood, Plywood, Hardboard
8" to 72" in diameter

Durkee Manufacturing Co. Inc.
Pine River, Minnesota

John E. Eckert, who holds a Mechanical Engineering degree from Clarkson Institute of Technology, joined the company in 1956, when Waterbury-Farrel acquired the Armzen Company, manufacturers of Sendzimir rolling mills. He was elected to his present position in 1960.

* * *

France Q. Wilson became a member of the Waterbury-Farrel staff in 1960. He holds a degree in Electrical Engineering from the University of Kansas. He has had experience in marketing with several nationally known firms and assumed the post of Vice President — Marketing when he entered the company's employ.

Joseph Gold

Joseph Gold, Manager of **Diamond Mining and Drilling Bit Department** of the **Diamond Tool Research Company,** N. Y. C., died June 10, 1961, as the result of a sudden heart attack.

* * *

He was 38 years old and lived in Brooklyn, N. Y.

* * *

Mr. Gold had been the Diamond Bit Department Manager for DTR for seven years.

Read
WIRE AND WIRE PRODUCTS
TO KEEP YOURSELF WELL INFORMED

NEP • SUMFOAM
ACID INHIBITOR • PICKLING COMPOUND
THE PARKIN CHEMICAL CO.
HIGHLAND BLDG. PITTSBURGH 6, PA.

NEW—LINE—GORCY
mechanical
wire rod descalers
FISHER ASSOCIATES
122 East 42nd St. New York 17, N. Y.

WEBB WIRE "works where others won't"
Stainless • Needle • Nickel Alloy
Available in round, square and rectangular shapes
WEBB WIRE
DIVISION OF THE CARPENTER STEEL CO., NEW BRUNSWICK, N. J.

Zinc Metallizing Wire
THE PLATT BROS. & CO.
Waterbury 20, Connecticut

SAXL TENSION METERS
Quick Trigger Action
For Wire Drawing, Insulating, Enameling and Coil Winding
American made and serviced, always reliable
TENSITRON, INC., Harvard, Mass. Patented

METALLIZING WIRE
PURE ZINC and CADMIUM
Other Fine Bare Wires
Manufactured to Your Specifications
IMMEDIATE DELIVERY
STAMFORD PROCESSING CO.
P. O. Box 65 Buchanan, New York

CLEVELAND TRAMRAIL
Division of
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE, OHIO
Leading manufacturers of
OVERHEAD MATERIALS HANDLING EQUIPMENT
for the Wire and Wire Products Industry

Lithographed Metal
SPOOLS
For Insulated Wire, Cable & Solder
CARLTON MANUFACTURING CO.
593 Mineral Spring Ave., Pawtucket, R. I.

WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames — Take-Up Frame, Wire — Pointers — Pulley Tongs — General and heat resisting alloy castings for wire mill use.
Circulars on Request
E. J. Scudder Foundry & Machine Co.
TRENTON, N. J.

WOOD REELS
FOR
CABLE • ROPE • WIRE
QUICK DELIVERIES ON ASSEMBLED OR KNOCKED DOWN REELS
SHIPPED FROM BALTIMORE, MD.
HARTSELLE, ALA. (BAKER MFG. CO.)
The NELSON Company
STANDARD OIL BLDG. BALTIMORE 2, MD.

Immediately Available
WIRE WORKING MACHINERY

FOURSLIDES: Baird, Nilson & Manville, Nos. 0, 1, 2, 3, 4, 5, 3-20, 4-26
U. S. Tool Co. No. 22, 28, & 33 Multislides
Sleeper & Hartley Spring Coilers Nos. 0, 1, 2, 3, 3½, 4, & 5 & Torrington W10 & W12
Vaughn No. 8, 10, & 12 Moto-Blocs
Waterbury No. 3 Bull Blocks, Duplex
Morgan 4 stand Wire Drawer with pointer and 100 H.P. motor drive & motor
Waterbury Nos. 1, 2, & 3 Continuous Wire Drawing Machines

PARTIAL STOCK LISTING
"The most diversified stock of machinery in the country. If it's machinery we have it."

National Machinery Exchange
130 Mott St., New York 13, N. Y.
CAnal 6-2470

WIRE ENGINEER
Methods and Process Knowledge of Wire Drawing, Stranding, Annealing and Plating: Salary Commensurate with Experience.

HUDSON WIRE COMPANY
62 Water Street
Ossining, New York

FOR SALE
WIRE WORKING MACHINERY
1—Four Wire Vertical Cabling Machine, Wardwell 12 and 16 Carrier Braiders. Terkelsen Wrappers, Models 1C & 3C Bunchers, Butt Welders, Take Ups.
ARE WE ON YOUR MAILING LIST? ARE YOU ON OURS?
JOHNSON MACHINERY COMPANY
90 Elizabeth Avenue, Elizabeth, N. J.
Tel. ELizabeth 5-2300

STEADY BUYERS of scrap wire with all type insulations—bare and plated wires, good returns to you on silver plated wire with and without insulation. Teflon Butt Ends, Mixed Colors. Copper Mud. Tin Skimmings. Good pickup service—prompt payments. Rated Company. Est. 1900.

ELECTRO METALS SEPARATION CO.
Division of
M. J. Stavola & Co. Inc.
307 White St. Danbury, Conn.

WANTED
working foreman for small stainless wire drawing and wire flattening operation. Experience necessary. Apply to:

ULBRICH STAINLESS STEELS, INC.
Old Colony Road
Wallingford Connecticut

FOR SALE BY OWNER
One size 22 x 22 x 60 Farrel-Birmingham Plastic Mill with automatic Dry Blend Feeder, Cut Over and Strip Cut Off Devices, Force Feed Lubrication. Complete with 125 H.P. G.E. Motor, 440 Volt Control, Reduction Gear Unit Safety Devices, etc. Excellent Condition — New 1954.

THE PLASTIC WIRE & CABLE CORPORATION
Jewett City, Connecticut
Phone — DRake 6-4411

A Review of Recent Wire Patents

(*Continued from page* 916)

the bobbin gear to wind wire from the bobbin onto the core, a movable kicker member for engaging a turn of wire on the core to move the core, a fixed nose on a core holding member adapted to be engaged by the kicker member, with a device for moving the kicker member away from the nose, and a spring for urging the kicker member toward the nose.

* * *

No. 2,986,351, TOROIDAL COIL WINDING MACHINE, patented May 30, 1961 by Robert P. Matthews, 1606 Inez Drive, N.E., Albuquerque, N. Mex.

A magnetic guide roller for supporting the magnetic shuttle of a toroidal coil winding machine is disclosed, comprising a rotatable magnetic shaft having a cylindrical end portion with a peripheral edge for bearing against the side of the shuttle, a cylindrical nonmagnetic portion of smaller diameter than the magnetic portion and mounted coaxially contiguous with the magnetic portion and adapted to make rolling contact with the inner periphers of the shuttle.

* * *

No. 2,986,356, REEL, patented May 30, 1961 by Herschel F. Hawkins, Brookville, Ohio, assignor to The H. F. Hawkins & Son Company, Brookville, Ohio, a corporation of Ohio.

Included in the reel construction are spaced-apart rods extending to each of the reel heads and extending thereinto and disposed beneath a sleeve on which the wire is wound. Means is provided for locking the reel heads to the rods.

MPM Issues New Catalog

The various types, functions and operating features of MPM thermoplastic processing equipment is shown in a new, 16-page, 2-color catalog issued by **Modern Plastic Machinery Corporation,** Clifton, N. J.

* * *

Each line of equipment is described in individual double page sections in the new brochure. The machines illustrated include: A complete range of extruders from 1″ to 12″ in diameter, chill roll casting equipment, blow molding equipment, monofilament lines, blown film take-up machines, and special equipment, such as laboratory extruders, laminating and casting dies, heavy sheet dies and many other special MPM-designed units.

* * *

The catalog is available from Modern Plastic Machinery Corp., 64 Lakeview Ave., Clifton, N. J.

JOIN THE WIRE ASSOCIATION
send for booklet

FINE WIRE ENAMELING OVENS
COLBOURNE MACHINE COMPANY
21 MUNRO ST. • WINSTED, CONN.

Wire Measuring MACHINES
Precision-built for accuracy and speed. Most complete line offered. • send for CATALOG #40 FREE
DURANT MANUFACTURING COMPANY
1918 N. Buffum Street Milwaukee 1, Wisconsin • 18 Thurbers Avenue Providence 5, R. I.

WIRE MILL CONSULTANT
Layouts • Equipment • Processes • Costs
WILLIAM D. BAWDEN
66 Belden Hill, Wilton, Conn.
Tel.: POrter 2-3529

ACTIVE PARTNER WANTED
Wire, Cable & Allied Machinery experience to join in expanding presently operating used machinery business with following, N. Y. area. Cash necessary, $20,000.00. All to remain in business. Have some stock.
Reply to Box 1081
WIRE & WIRE PRODUCTS

PLASTIC WIRE CAREER OPPORTUNITY
Man versed in all phases of plastic electrical wire manufacture with emphasis on production and tooling experience wanted by expanding West Coast manufacturer. Applications will be held in strict confidence. Send complete resume to:
Box 1082
WIRE AND WIRE PRODUCTS

FOR SALE
1—Cook BH-24 Buncher.
1—Kitselman Continuous Clothes Line Coiler
Reply to Box 1080
WIRE AND WIRE PRODUCTS

MACHINERY WANTED
Good used Wire Drawing Machine ¼″ capacity, having 6 or 7 Draw Blocks.
CAVALER SPRING CO., INC.
7924 Riopelle
Detroit, Michigan

FOR SALE
MALMEDIE WIRE POINTERS
One Capacity .118″ to.412″
One Capacity .078″ to .315″
STRAUS-ARTYS CORP.
45 No. Station Plaza, Great Neck, N. Y.
Phone—HU 2-4514

Index to Advertisers

A

Acrometal Products, Inc. 932
Ajax Electric Company 923
Ajax Industrial Supplies, Inc. 940
Alabama Wire Die Co. 940
American Chain & Cable Company, Inc.
Page Steel & Wire Division 822
American Insulating Machinery Company 936
American Laubscher Corporation—Nichoff Machine Works 847
American Laubscher Corporation—Braun-Angott 909
Antrim Reel, Inc. 935
Apco Mossberg Company 900

B

Balloffet-Vianney Wire Die Co., Inc. 938
Bartell Machine-Tool Corp. 941
Bawden, William D. 942
Boulin, Victor J., Inc. 940
Brenon, Inc. 940
Bridge Manufacturing Company 827

C

Camden Wire Co., Inc. 925
Carl Mayer Corp., The 830
Carlton Manufacturing Co. 941
Carpenter Steel Co., The Webb Wire Div. 941
Central Tool & Machine Co., Wire Tool Division 934
Chadwick Yarn Company 937
Chemical Products Corporation 826
Circle Chemical Company 932
Cleveland Tramrail Division
The Cleveland Crane & Engineering Co. 941
Climax Molybdenum Company, a division of
American Metal Climax, Inc. 824
Colbourne Machine Company ..... 941 and 942
Cold Forging Machines, Inc. 927
Colorado Fuel & Iron Corporation, The ..... 828 and 829
Continental Steel Corporation 902
Cook Manufacturing Company 910
Coulter & McKenzie Machine Co., Inc., The ..... Inside Front Cover

D

Danforth, C. W., Co. 938
Davis Electric Co. 941
Davis-Standard Division of Franklin Research
and Development Corporation ..... 873, 874, 875 and 876
Detroit Steel Corporation 898
Durant Manufacturing Company 942
Durkee Manufacturing Co., Inc. 941
Dykrex Corporation 930

E

Eastern Carbide Corp. 940
Edmands Co., The 928
Electro Metals Separation Co.,
Div. of M. J. Stavola & Co., Inc. 942
Elgin National Watch Company, Abrasives Division 892
Emery, Robert J., Co. 941
Enjaco Corporation 932
Entwistle Manufacturing Corporation 901

F

Federal Manufacturing Co., The 941
Fenn Manufacturing Company, The 838
Fisher Associates 941
Fort Wayne Diamond Products, Inc. 940
Fort Wayne Wire Die, Inc. 940

G

Gavlick Machinery Corporation 927
Gem Gravure Co., Inc. 907
General Engineering Co., (Radcliffe) Ltd. 840
Gillies, Duncan M., Co., Inc. 899
Glader, Wm., Machine Works 906

H

Hanson & Edwards, Ltd. 916
Haskell-Dawes Machine Co., Inc. 925
Heany Industrial Ceramic Corp. 936
Herborn Machinery Corp. 854
Hoosier Wire Die., Inc. 940
Hubbard Spool Division, Van Norman
Industries, Inc. 858
Hudson Wire Company 911
Hutten-und Bergwerke Rheinhausen, AG 921

I

Indiana Wire Die Company ..... 939 and 940
Interlocking Fence Co. 918

J

Jersey Specialty Co., Inc. 937
Johnson Machinery Company 942

K

Kelly Wire Die Corporation 940
Kenner, Paul I. 928
Kenrich Petrochemicals, Inc. 851
Keystone Steel & Wire Company 837
Krupp, Fried Maschinen und Stahlbau 913

L

Laribee Wire, Inc. 896
Larmuth (1947) Ltd. 926
Lewis Machine Company, The 849

M

Malin & Company, The 933
Manco Mfg. Co. 905
Merrimac Spool & Reel Co., Inc. 935
Mettler Machine Tool, Inc. 834
Micro Products Company 885
Miller, R. H., Company, Inc. 860
Monsanto Chemical Company, Plastics Division 830
Montgomery Company, The 934
Morgan Construction Co. 843
Mossberg Pressed Steel Corporation
Division of Wanskuck Co. 908

N

National Machinery Co. 931
National Machinery Exchange 942
National Wire Die Co., Inc. 940
Nelson Company, The 941
New England Butt Co.
Division of Wanskuck Company 935
New England Wire Die Co. 940
Niederrheinische Hutte, A. G., Kurt Orban Company, Inc. 853
Niehaus, K. A. Machinenfabrik—Paul Reicher Machinery
& Equipment, Ltd. 856
Nippon Stainless Steel Wire Mfg. Co., Ltd. 933
Northwestern Steel and Wire Company 841

O

Ofenbau, Fritz, Gm.b.H. & Co., K.G. 915
Orban, Kurt, Company, Inc., Niederrheinische Hutte A. G. 853

P

Page Steel & Wire Division
American Chain & Cable Company, Inc. 822
Pangborn Corporation 832
Parkin Chemical Co., The 941
Pittsburgh Carbide Die Co. 940
Platt Bros. & Co., The 941
Porter, Inc., H. K. 917
Prutton Corporation 904

R

Reicher, Paul, Machinery & Equipment, Ltd.—
K. A. Niehaus Machinenfabrik 856
Republic Steel Corporation 930
Robinson, M. W., Co., Inc. 825
Roebling's, John A., Sons Division
The Colorado Fuel and Iron Corporation 855
Royle, John & Sons 857
Rusch Wire Die Corporation 940

S

S.A.M.P., Emilio Wartenweiler 839
Scott Testers, Inc. 937
Scudder, E. J. Foundry & Machine Co. 941
Showa Machine Works Ltd. 833
Sjogren Tool & Machine Co., Inc. 919
Stamford Processing Co. 941
Standard Industrial 821
Standard Mill Supply Company 934
Steel Equipment Company 831
Straus-Artys Corp. 942
Sumitomo Metal Industries Ltd. 842
Superior Tool & Manufacturing Co. 933
Swift & Company, Soap Department 929
Syncro Machine Company ..... Back Cover
Synthetic Thread Co. 936

T

Tensitron, Inc. 941
Twitchell, E. W., Inc. 903

U

Universal Industrial Equipment Co. 914
U. S. Borax 931

V

Van Norman Industries, Inc.
Hubbard Spool Division 858
Vaughn Machinery Company, The ..... Front Cover

W

Wafios Machinery Corp. 835
Wartenweiler, Emilio, S.A.M.P. 839
Watson Machine Company, The ..... Inside Back Cover
Wayne Wire Die Co. 938
Webb Wire Div., The Carpenter Steel Co. 941
Wells, Frank L., Company 920
Western Wire & Textile Machinery, Inc. 928
Whitacre Corporation 823
Wilson, Lee, Engineering Co., Inc. 845
Wire and Textile Machinery, Inc. 935
Wire Machinery, Inc. 894

Y

Yawata Iron & Steel Co., Ltd. 844

WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Buyer's Guide. Advertisers who have contracted for 6 or more insertions are entitled to up to 8 listings in this section of Wire and Wire Products.

ABRASIVES—
Alabama Wire Die Co., Fayette, Ala.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.

ABRASIVES— Shot & Grit, For Cleaning
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.
Walco Electric Co., Providence, R. I.

ANNEALING POTS AND BOXES—
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BAR—Steel
Eaton Mfg. Co., Massillon, Ohio

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

BORAX—Wire Drawing
U. S. Borax, New York, N. Y.

BRAZERS—Electric for Wire
Steele Company, M. G., Rome, N. Y.

CABLE ACCESSORIES
Southwire Co., Carrollton, Ga.

CABLE—Electric
Laribee Wire Inc., Camden, N. Y.
Southwire Co., Carrollton, Ga.

CABLE FILLERS—Paper
Ludlow Corporation, Needham Heights, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

CAPSTANS—for Wire (also Caterpiller Types)
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Div. of Franklin Research and Development Corp. Mystic, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Engineering (Radcliffe) Co., Ltd., Manchester, England

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Refractory
Amchem Products, Inc., Ambler, Pa.

CLEANERS—Metal
Amchem Products, Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Circle Chemical Co., Chicago, Ill.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.
Wheelabrator Corporation, Mishawaka, Ind.
Wilson, Lee, Engr. Co., Cleveland, Ohio

CLOTH—WIRE, All Metals
Hudson Wire Co., Pequot Div., Norwalk, Conn.
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Amchem Products, Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Chemical Products Corporation, E. Providence, R. I.
Magnuson Products Corp., Brooklyn, N. Y.
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
U. S. Borax, New York, N. Y.

COLOR CONCENTRATES—For Wire Coatings
Blane Corporation, The, Canton, Mass.

COMPOUNDS—Brazing
Steele Company, M. G., Rome, N. Y.

COMPOUNDS—Coppering
Amchem Products, Inc., Ambler, Pa.
Circle Chemical Co., Chicago, Ill.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Alabama Wire Die Co., Fayette, Ala.
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

COMPOUNDS—Extrusion, for Wire
Amchem Products, Inc., Ambler, Pa.
Blane Corporation, The, Canton, Mass.
Circle Chemical Co., Chicago, Ill.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—For Improving Drawing & Extrusion
Amchem Products, Inc., Ambler, Pa.
Circle Chemical Co., Chicago, Ill

COMPOUNDS—Metal Finishing
Amchem Products Inc., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Chemical Products Corporation, E. Providence, R. I.
Circle Chemical Co., Chicago, Ill.

COMPOUNDS—Phosphate Coating
Amchem Products Inc., Ambler, Pa.
Circle Chemical Co., Chicago, Ill.

COMPOUNDS—Rust Preventing
Amchem Products, Inc., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Chemical Products Corporation, E. Providence, R. I.
Circle Chemical Co., Chicago, Ill.

COMPOUNDS—Rust Removing
Amchem Products, Inc., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corp., Brooklyn, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Vinyl
Blane Corporation, The, Canton, Mass.
Chemical Products Corporation, E. Providence, R. I.
Kenrich Petrochemicals, Inc., Maspeth, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Union Carbide Plastics Company, Div. of Union Carbide Corporation, New York, N. Y.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Climax Molybdenum Co., Div., American Metal Climax, Inc., New York, N. Y.
Magnuson Products Corp., Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
U. S. Borax, New York, N. Y.

CONDUCTORS—Flexible, Electrical
Hudson Wire Co., Ossining, N. Y.
Laribee Wire Inc., Camden, N. Y.
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

CONTROL PANELS—
Walco Electric Co., Providence, R. I.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.

CUTTING TOOLS—Carbide
Eastern Carbide Corp,, New Rochelle, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.

CUTTING TOOLS—Wire
Manco Mfg. Co., Bradley, Ill.
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockville, Conn.

DIAMONDS—Industrial
Alabama Wire Die Co., Fayette, Ala.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Indiana Wire Die Co., Ft. Wayne, Ind.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIAMOND POWDERS—
Danforth Company, C.W., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Fort Wayne Diamond Products, Inc., Fort Wayne, Indiana
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIAMOND POWDER RECLAIMING—
Alabama Wire Die Co., Fayette, Ala.
Danforth Company, C.W., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Fort Wayne Diamond Products, Inc., Fort Wayne, Indiana
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Wayne Wire Die Co., Linden, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.

DIES—Diamond
Alabama Wire Die Co., Fayette, Ala.
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J. Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Roux Wire Die Works, Inc., Oriskany, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES DIAMOND—Controlled Drawing Angle
Hoosier Wire Die, Inc., Fort Wayne, Ind.

DIES DIAMOND—Reversible
National Wire Die Co., Inc., New York, N. Y.

DIES—Extrusion
Alabama Wire Die Co., Fayette, Ala.
Central Tool and Machine Co., Bridgeport, Conn.
Eastern Carbide Corp., New Rochelle, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.

Rusch Wire Die Corp., Croton-on-Hudson, N.Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Fenn Manufacturing Co., Newington, Conn.
Sjogren Tool & Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Roux Wire Die Works, Inc., Oriskany, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Swaging
Fenn Manufacturing Co., Newington, Conn.
Sjogren Tool & Mach. Co., Inc., Auburn, Mass.

DIES—Tinning
Roux Wire Die Works, Inc., Oriskany, N. Y.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Variable Speed
Allis Co., Louis, Milwaukee, Wisc.
Walco Electric Co., Providence, R. I.

DRUMS—Wire Packaging
Hubbard Spool Company, Div., Van Norman Industries, Inc., Garrett, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Company, Div., Van Norman Industries, Inc., Garrett, Ind.
Republic Steel Corp., Berger Div., Canton, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio

DUST COLLECTORS—Wet or Dry
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.

ENGINEERS—Consulting
Bawden, William D., Wilton, Conn.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
Amchem Products, Inc., Ambler, Pa.
Chemical Products Corporation, E. Providence, R. I.
Parkin Chemical Co., The, Pittsburgh, Pa.

FURNACES—Annealing, Vacuum
American Laubscher Corporation, New York, N. Y.

FURNACES—Brazing
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Galvanizing Equipment
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen, (W. Germany)
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Company, Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen, (W. Germany)
Wilson Lee Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen, (W. Germany)

FURNACES—Salt Bath
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Strand Annealing
Ajax Electric Company, Philadelphia, Pa.
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen, (W. Germany)

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GUIDES—For Wire
Alabama Wire Die Co., Fayette, Ala.
Heany Industrial Ceramic Corp., New Haven, Conn.
Indiana Wire Die Co., Fort Wayne, Ind.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool & Machine Co., Auburn, Mass.

HOISTS—Electric
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Walco Electric Co., Providence, R. I.

INHIBITORS—Pickling
Amchem Products, Inc., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Chemical Products Corporation, E. Providence, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.

INSULATING MATERIALS—
Blane Corporation, The, Canton, Mass.
Dow Corning Corporation, Midland, Mich.
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
Kenrich Petrochemicals, Inc., Maspeth, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

LACQUERNG SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Climax Molybdenum Co., Div., American Metal Climax, Inc., New York, N. Y.
Swift & Co., Chicago, Ill.

MACHINE CONTROLS—Electronic
Allis Co., Louis, Milwaukee, Wisc.

MACHINERY—Armoring (Cable, Wire, Hose)
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.

MACHINERY—Blast Cleaning
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.

MACHINERY—Bobbin Winders
Hanson & Edwards, Ltd., Warrington, England

MACHINERY—Bolt, Rivet, Screw, etc.
Gavlick Machinery Corporation, Bridgeport, Conn.
National Machinery Co., Tiffin, Ohio
Prutton Corporation, Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Waterbury-Farrel Fdy. & Mach. Co., Inc., Div. of Textron, Inc., Waterbury, Conn.

MACHINERY—Braiding
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Fall, R. I.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Brazers for Wire
Steele Company, M. G., Rome, N. Y.

MACHINERY—Bunching
Cook Mfg. Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Miyazaki Iron Works, Ltd., Osaka, Japan
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Niehaus K. A. Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Cable, Electric
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corp., New York, N. Y.

MACHINERY—Chain Link Fence
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Chain Making
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Closing Cable
Miyazaki Iron Works, Ltd., Osaka, Japan
Niehaus, K. A. Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Coulter & MacKenzie Machine Co., Bridgeport, Conn.
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdy. & Mach. Co., Inc., Div. of Textron, Inc., Waterbury, Conn.

MACHINERY—Cold Forging
National Machinery Co., Tiffin, Ohio
Unitech Products, Inc., Hartford, Conn.

MACHINERY—Cold Heading
National Machinery Co., Tiffin, Ohio
REM Sales Incorporated, Subsidiary of The Robert E. Morris Co., West Hartford, Conn.
Straus-Artys Corp., Great Neck, N. Y.
Waterbury-Farrel Fdy. & Mach. Co., Inc., Div. of Textron, Inc., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
Cook Mfg. Co., The, Paterson, N. J.
Herborn Machinery Corporation, Hackensack, N. J.
Johnson Machinery Co., Elizabeth, N. J.
Loma Machine Manufacturing Co., New York, N.Y.
Morgardshammars Mek Verkstads A. B., Morgardshammar, Sweden
National Mach'y Exch., (Used), New York
Showa Machine Works, Ltd., Osaka, Japan
Straus-Artys Corp., Great Neck, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdy. & Mach. Co., Inc., Div. of Textron, Inc., Waterbury, Conn.
Whitacre Corporation, Alhambra, California

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Cutters, Hydraulic for Rod & Bar
Manco Mfg. Co., Bradley, Ill.
Porter, H. K., Inc., Somerville, Mass.

MACHINERY—Dead Block (Stationary Coiler)
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wells Company, Frank L., Kenosha, Wisc.
Whitacre Corporation, Alhambra, California
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Descaling Rod, Dry
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fisher Associates, New York, N. Y.
Herborn Machinery Corporation, Hackensack, N. J.
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Die Making
Alabama Wire Die Co., Fayette, Ala.
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Sjogren Tool & Machine Co., Auburn, Mass.
Wayne Wire Die Co., Linden, N. J.

MACHINERY—Draw Benches
American Laubscher Corp., New York, N. Y.

Gavlick Machinery Corporation, Bridgeport, Conn.
Loma Machine Manufacturing Co., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Edging (See MACHINERY—Tandem Rolling and Edging Mills)

MACHINERY—Enameling
Acrometal Products, Inc., Minneapolis, Minn.
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Cold Forging Machines, Inc., Elyria, Ohio

MACHINERY—Extruding
Davis-Standard Division of Franklin Research and Development Corporation, Mystic, Conn.
General Engineering (Radcliffe) Co., Ltd., Manchester, England
Johnson Machinery Co., Elizabeth, N. J.
Royle, John, & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Herborn Machinery Corporation, Hackensack, N. J.
Loma Machine Manufacturing Co., New York, N. Y.
Mettler Machine Tool, Inc., New Haven, Conn.
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Forming Wire
Cold Forging Machines, Inc., Elyria, Ohio
Gavlick Machinery Corporation, Bridgeport, Conn.
National Mach'y Exch., (Used), New York, N. Y.
Straus-Artys Corp., Great Neck, N. Y.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Galvanizing Wire
Miyazaki Iron Works, Ltd., Osaka, Japan
Ofenbau Fritz G.m.b.H. & Co., K. G., Hagen, (W.-Germany)
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Whitacre Corporation, Alhambra, California
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.

MACHINERY—Insulating Wire
American Insulating Mach'y. Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research and Development Corporation, Mystic, Conn.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Insulation Testing (See MACHINERY—Spark Testing)

MACHINERY—Lacquering Electric Wire
Cook Mfg. Co., The, Paterson, N. J.

MACHINERY—Lock Washer
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Looms, Wire Weaving
Cold Forging Machines, Inc., Elyria, Ohio
EVG., Machinen & Stahl, A. G., Zurich, Switzerland

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wisc.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
General Engineering (Radcliffe) Co., Ltd., Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.

MACHINERY—Measuring and Control—Coating
Davis-Standard Div. of Franklin Research and Development Corp., Mystic, Conn.

MACHINERY—Nail and Tack
Cold Forging Machines, Inc., Elyria, Ohio
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Co., Tiffin, Ohio
National Mach'y Exch. (Used), N.Y., N.Y.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Whitacre Corporation, Alhambra, California

MACHINERY—Patenting Wire
Ofenbau Fritz G.m.b.H. & Co., K. G., Hagen, (W.-Germany)
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Whitacre Corporation, Alhambra, California

MACHINERY—Pin
REM Sales Incorporated, Subsidiary of The Robert E. Morris Company, West Hartford, Conn.

MACHINERY—Plating
Bartell Machine Tool Corp., Rome, N. Y.
Cold Forging Machines, Inc., Elyria, Ohio
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Herborn Machinery Corporation, Hackensack, N. J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch., (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Straus-Artys Corp., Great Neck, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Fdy. & Mach. Co., Inc., Div. of Textron, Inc., Waterbury, Conn.

MACHINERY—Preheaters, Wire
Walco Electric Co., Providence, R. I.

MACHINERY—Printing on Electric Wire
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Co., West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

MACHINERY—Re-Spooling
Acrometal Products, Inc., Minneapolis, Minn.
Bartell Machine Tool Corp., Rome, N. Y.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Herborn Machinery Corporation, Hackensack, N. J.
Miyazaki Iron Works, Ltd., Osaka, Japan
National Mach'y Exch. (Used), New York, N. Y.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y Inc., (used), Pawtucket, R. I.

MACHINERY—Rod Mill
Herborn Machinery Corporation, Hackensack, N. J.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Loma Machine Manufacturing Co., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Waterbury-Farrel Fdy. & Mach. Co., Inc., Div. of Textron, Inc., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research and Development Corporation, Mystic, Conn.
Royle, John & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y Inc., (used), Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Slitting Mills
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Special
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.

MACHINERY—Spring Making
Cold Forging Machines, Inc., Elyria, Ohio
Gavlick Machinery Corporation, Bridgeport, Conn.
National Mach'y Exch., (Used), New York, N. Y.
Wafios Machinery Corp., Hackensack, N. J.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Straightening & Cutting
American Laubscher Corp., New York, N. Y.
Cold Forging Machines, Inc., Elyria, Ohio
Gavlick Machinery Corporation, Bridgeport, Conn.
Johnson Machinery Co., Elizabeth, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Loma Machine Manufacturing Co., New York, N. Y.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N.Y.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wafios Machinery Corp., Hackensack, N. J.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Stranding
Bartell Machine Tool Corp., Rome, N. Y.
Cold Forging Machines, Inc., Elyria, Ohio
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Phila., Pa.
Johnson Machinery Co., Elizabeth, N. J.
Miyazaki Iron Works, Ltd., Osaka, Japan
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Gavlick Machinery Corporation, Bridgeport, Conn.

MACHINERY—Tandem Rolling & Edging Mills
Fenn Manufacturing Co., Newington, Conn.
Loma Machine Manufacturing Co., New York, N. Y.
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.

MACHINERY—Take-Up and Pay-Out
Acrometal Products, Inc., Minneapolis, Minn.
American Insulating Mach'y Co., Phila., Pa.
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research and Development Corporation, Mystic, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
General Engineering (Radcliffe) Co., Ltd., Manchester, England
Johnson Machinery Co., Elizabeth, N. J.
Miyazaki Iron Works, Ltd., Osaka, Japan
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine) France
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.
Whitacre Corporation, Alhambra, California

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine) France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Thread Rolling
Mettler Machine Tool, Inc., New Haven, Conn.
Prutton Corporation, Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Waterbury-Farrel Fdy. & Mach. Co., Inc., Div. of Textron, Inc., Waterbury, Conn.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa
Cook Mfg. Co., The, Paterson, N. J.

Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Universal Industrial Equipment Co., Secaucus, N. J.
Whitacre Corporation, Alhambra, California

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, Ohio

MACHINERY—Tube Mill, Cold Drawing
Johnson Machinery Co., Elizabeth, N. J.
Loma Machine Manufacturing Co., New York, N. Y.
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N.J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
Gavlick Machinery Corporation, Bridgeport, Conn.
Johnson Machinery Co., Elizabeth, N. J.
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Variable Speed Drives
Allis Co., Louis, Milwaukee, Wisc.

MACHINERY—Welded Wire Mesh
EVG, Maschinen and Stahl, A.G., Zurich, Switzerland
Sommer Products Company, Peoria, Ill.

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery—Welding Wire Fabrics)

MACHINERY—Winding Wire
Davis Electric Co., Wallingford, Conn.
Davis-Standard Div. of Franklin Research and Development Corp., Mystic, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Cranston, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Miyazaki Iron Works, Ltd., Osaka, Japan
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.

MACHINERY—Wire Drawing
American Laubscher Corporation, New York, N. Y.
Cook Manufacturing Co., The, Paterson, N.J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Co., Newington, Conn.
Gavlick Machinery Corporation, Bridgeport, Conn.
Herborn Machinery Corporation, Hackensack, N. J.
Johnson Machinery Co., Elizabeth, N. J.
Loma Machine Manufacturing Co., New York, N. Y.
Miyazaki Iron Works, Ltd., Osaka, Japan
Morgan Construction Co., Worcester, Mass.
Morgardshammars Mek Verkstads AB, Morgardshammar, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Showa Machine Works Ltd., Osaka, Japan
Societa Generale Delle Macchine Mill, Milan, Italy
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Straus-Artys Corp., Great Neck, N. Y.
Superior Tool & Machinery Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Wartenweiler, Emilio, Milano, Italy—SAMP
Waterbury-Farrel Fdy. & Mach. Co., Inc., Div. of Textron, Inc., Waterbury, Conn.
Whitacre Corporation, Alhambra, California
Wire Machinery Inc., Chicago, Ill.

MACHINERY—Wire Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
American Laubscher Corp. New York, N. Y.
Larmuth (1947) Ltd., Cheshire, England

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio

MOLYBDENUM-DISULFIDE—Lubricants
Climax Molybdenum Company, a division of American Metal Climax, Inc., New York, N. Y.

MOTORS—Electric
Allis Co., Louis, Milwaukee, Wisc.
Walco Electric Co., Providence, R. I.

NAIL TOOLING—Tungsten Carbide
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Central Tool and Mach. Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Co., Winsted, Conn.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAPER—Coil Wrapping
Ludlow Corporation, Needham Heights, Mass.

PAPER—Insulating
Ludlow Corporation, Needham Heights, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Kenrich Petrochemicals, Inc., Maspeth, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

PLASTICS—for Wire Insulation
Blane Corporation, The, Canton, Mass.
Chemical Products Corporation, E. Providence, R. I.
Dow Corning Corporation, Midland, Mich.
Kenrich Petrochemicals, Inc., Maspeth, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Union Carbide Plastics Company, Div. of Union Carbide Corporation, New York, N. Y.
Union Carbide Corporation, Silicones Division, New York, N. Y.

PREHEATERS—Wire
Walco Electric Co., Providence, R. I.

PRINTING WHEELS—for Electric Wire
Daniels & Co., Frank, New York, N. Y.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Co., Inc., West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

PULLERS AND GRIPS—for Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool & Mach. Co., Auburn, Mass.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Acrometal Products, Inc., Minneapolis, Minn.
Mettler Machine Tool, Inc., New Haven, Conn.
Northern Indiana Steel Supply Co., Michigan City, Ind.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Merrimac Spool & Reel Co., Inc., Haverhill, Mass.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Republic Steel Corp., Berger Div., Canton, Ohio

REELS & SPOOLS—Custom Made
Merrimac Spool & Reel Co., Inc., Haverhill, Mass.

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.

REELS—Plywood
Antrim Reel, Inc., Haverhill, Mass.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Carlton Manufacturing Co., Pawtucket, R. I.
Clark Manufacturing Co., J. L., Rockford, Illinois
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Merrimac Spool & Reel Co., Inc., Haverhill, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Northern Indiana Steel Supply Co., Michigan City, Ind.
Republic Steel Corp., Berger Div., Canton, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Nelson Co., The, Baltimore, Md.
Northern Indiana Steel Supply Co., Michigan City, Ind.
Republic Steel Corp., Berger Div., Canton, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
Antrim Reel, Inc., Haverhill, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Nelson Co., The, Baltimore, Md.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio

RODS—Wire—Non-Ferrous
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Eaton Mfg. Co., Massillon, Ohio
Keystone Steel & Wire Co., Peoria, Ill.
Niederrheinische Huette, A. G., Duisburg, Germany
Northwestern Steel & Wire Co., Sterling, Illinois
Sumitomo Metal Industries, Ltd., Osaka, Japan
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Yawata Iron & Steel Co., Ltd., Tokyo, Japan

ROPE—Wire
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons, Div., Colorado Fuel & Iron Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Removing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SCRAP WIRE—Bare or Insulated, Bought
Electro Metals Separation Co. Div. of M. J. Stavola & Co., Inc., Danbury, Conn.

SILICONE RUBBER—For Wire Insulation
Dow Corning Corporation, Midland, Mich.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—For Retail Sale of Wire
Antrim Reel, Inc., Haverhill, Mass.
Carlton Manufacturing Co., Pawtucket, R. I.
Clark Manufacturing Co., J. L., Rockford, Illinois

SPOOLS—Paper
Merrimac Spool & Reel Co., Inc., Haverhill, Mass.

SPOOLS—Plastic
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Merrimac Spool & Reel Co., Inc., Haverhill, Mass.
Plastic Mold & Eng. Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.

STAMPINGS—Steel
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

STOCK STORAGE SYSTEMS—
Jarke Manufacturing Co., Chicago, Illinois

STRAND—Galvanized Steel
Southwire Co., Carrollton, Ga.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.

TANKS—Ceramic, for Galvanizing
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)

TENSION METERS—for Wire
Boulin Instrument Corp., Pelham, N. Y.
Tensitron, Inc., Harvard, Mass.

TESTERS—INSULATION
(See Testing Equipment—for Dielectric Faults)

TESTING EQUIPMENT—Dielectric Faults in Insulation
Davis Electric Co., Wallingford, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., Patterson, N. Y.

TESTING EQUIPMENT—Physical
Scott Testers, Inc., Providence, R. I.
Steele Company, M. G., Rome, N. Y.

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL-Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

TRANSMISSIONS—Variable Speed (See Adjustable Speed Drives)

TRAVERSE & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

VARNISHES & LACQUERS—for Electric Wire
Chemical Products Corporation, E. Providence, R. I.
General Electric Company, Insulating Materials Section, Schenectady, N. Y.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
EVG, Maschinen and Stahl, A.G., Zurich, Switzerland
Herborn Machinery Corporation, Hackensack, N. J.
Micro Products Co., Chicago, Ill.
Sommers Products Company, Peoria, Ill.

WHEELS—for Printing on Electric Wire
Daniels & Co., Frank, New York, N. Y.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

WIRE—ACSR
Southwire Co., Carrollton, Ga.

WIRE—Aluminum
Hudson Wire Co., Ossining, N. Y.
Malin & Co., The, Cleveland, Ohio
Southwire Co., Carrollton, Ga.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Ball & Roller Bearing
Eaton Mfg. Co., Massillon, Ohio

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brake Lining
Hudson Wire Co., Ossining, N. Y.

WIRE—Brass and Bronze
Malin & Co., The, Cleveland, Ohio

WIRE—Brush
Hudson Wire Co., Ossining, N. Y.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.

WIRE—Building, Electric
Southwire Co., Carrollton, Ga.

WIRE—Bunched and Stranded
Camden Wire Co., Camden, N. Y.
Laribee Wire, Inc., Camden, N. Y.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Pittsburgh Steel Co., Pittsburgh, Pa.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Copper
Camden Wire Co., Camden, N. Y.
Hudson Wire Co., Ossining, N. Y.
Laribee Wire, Inc., Camden, N. Y.
Malin & Co., The, Cleveland, Ohio
Southwire Co., Carrollton, Ga.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Laribee Wire, Inc., Camden, N. Y.

WIRE—Flat
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Montgomery Co., The, Windsor Locks, Conn.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Northwestern Steel & Wire Co., Sterling, Illinois
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Detroit Steel Corporation, Detroit, Mich.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Insulated
Southwire Co., Carrollton, Ga.

WIRE—Manufacturers
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Northwestern Steel & Wire Co., Sterling, Illinois
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Berger Div., Canton, Ohio
Roebling's, John A., Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Rylands Brothers Limited, Warrington, England
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Metalizing
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Malin & Co., The, Cleveland, Ohio

WIRE—Needle
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Malin & Co., The, Cleveland, Ohio

WIRE—Oil Tempered
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Malin & Co., The, Cleveland, Ohio
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Preheaters
Walco Electric Co., Providence, R. I.

WIRE—for Prestressed Concrete
Rylands Brothers, Limited, Warrington, England

WIRE—Pin
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.

WIRE—Special Shapes
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Eaton Mfg. Co., Massillon, Ohio
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Stainless Steel
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Malin & Co., The, Cleveland, Ohio
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Nippon Stainless Steel Wire Mfg. Co., Ltd., Osaka, Japan.
Pittsburgh Steel Co., Pittsburgh, Pa.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Malin & Co., The, Cleveland, Ohio
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Northwestern Steel & Wire Co., Sterling, Illinois
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Rylands Brothers, Limited, Warrington, England
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Stranded & Bunched
Hudson Wire Co., Ossining, N. Y.
Laribee Wire, Inc., Camden, N. Y.

WIRE—Tinned
Camden Wire Co., Camden, N. Y.
Laribee Wire, Inc., Camden, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WRAPPING PAPER—Creped
(See PAPER-Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

YARNS—Wire Insulating
Chadwick Yarn Company, Pawtucket, R. I.
Synthetic Thread Co., Bethlehem, Pa.

The WATSON MACHINE COMPANY
ESTABLISHED 1845
PATERSON 16, NEW JERSEY, U. S. A.

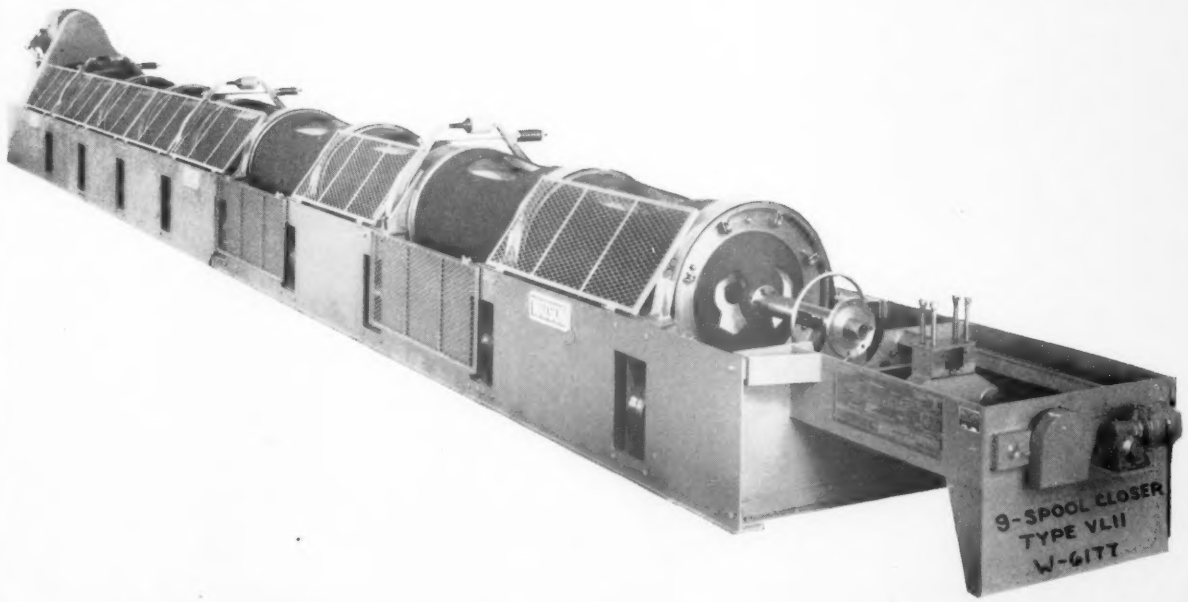
ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

NEW "VL"
CLOSERS -- STRANDERS

U.S. PATENTS 2,442,817 & 2,690,642

HEAD SHOWN LOADS 9-30" SPOOLS. THIS DESIGN IS ALSO AVAILABLE IN OTHER SIZES AND COMBINATIONS WITH ALL THE FOLLOWING FEATURES: EXTRA LOW LEAD ANGLES — HIGHEST POSSIBLE SAFE SPEEDS — PATENTED NO-LOOSE-PARTS QUICK LOADING "SHAFTLESS" CRADLES WITH AUTOMATIC SPOOL LOCKS — PATENTED CURL-REDUCING NOSE GUIDES —

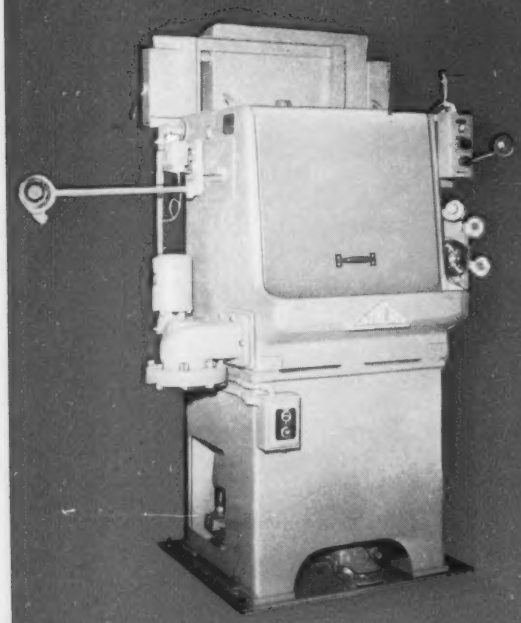


EXTRA LARGE, NOISE-DEADENING SUPPORT ROLLERS AT EACH SPOOL SECTION — SPIDER RIM ROLLER TRACKS. NO ROLLER TO TUBE CONTACT — SINGLE AND MULTI-SPEED SILENT DRIVES — REPLACEABLE TUBE WEAR GUARDS — PATENTED WIRE GUIDES — COMPLETE ELECTRIC AND VIBRATION STOP PROTECTION

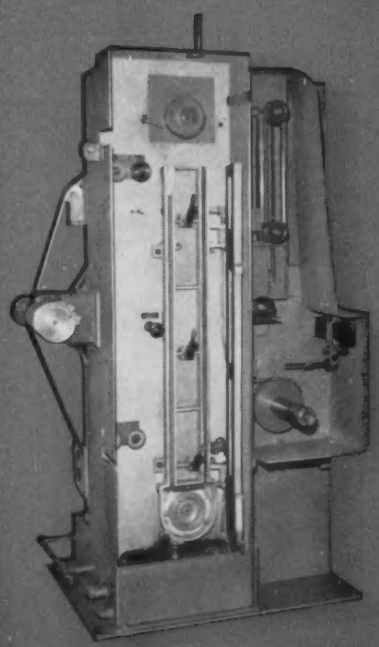
REQUEST NEWLY ISSUED "VL" BULLETIN

Our Design Aims: SAFETY — SIMPLICITY — PRODUCTIVITY

wire drawing · annealing · spooling



at highest possible • speeds from **SYNCRO**



Syncro Model BG Fine Wire Drawing Machine in combination with Model AB-3S Resistoneal* and Spooler gives you maximum production in one operation—Drawing, Annealing, Spooling. Finished wire ranges from #26 to #36 B&S gauge, while operating at maximum production speeds with up to 100 lb. capacity spool.

This is only one example of the pace setting, high quality machines in Syncro's complete line of Wire Drawing and Cable Mill machinery—the result of dynamic research and engineering.

Our engineers welcome the opportunity to assist you. For further information write to: Syncro Machine Company, Perth Amboy, New Jersey.

"Better Machinery for the Wire Industry"

*registered trademark

Stranders • Annealers • Wire Drawing Machines • Payoffs • Capstans • Heavy Duty Take-Ups

SYNCRO MACHINE COMPANY

affiliated company: Winget-Syncro Ltd., Rochester, Kent, England